O.P.E. JC104
APR 05 2005
PATENT & TRADEMARK OFFICE

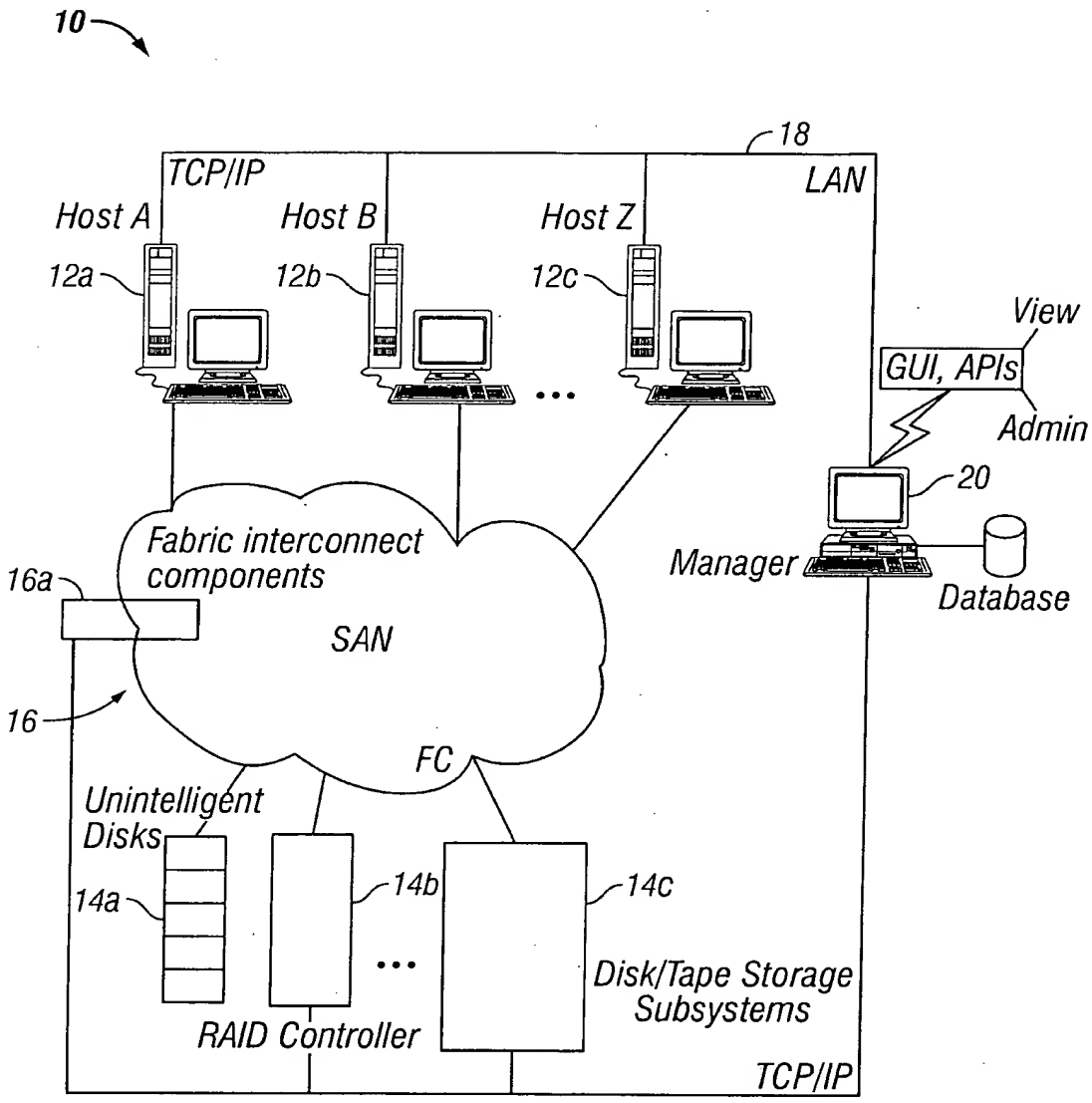

FIG. 1

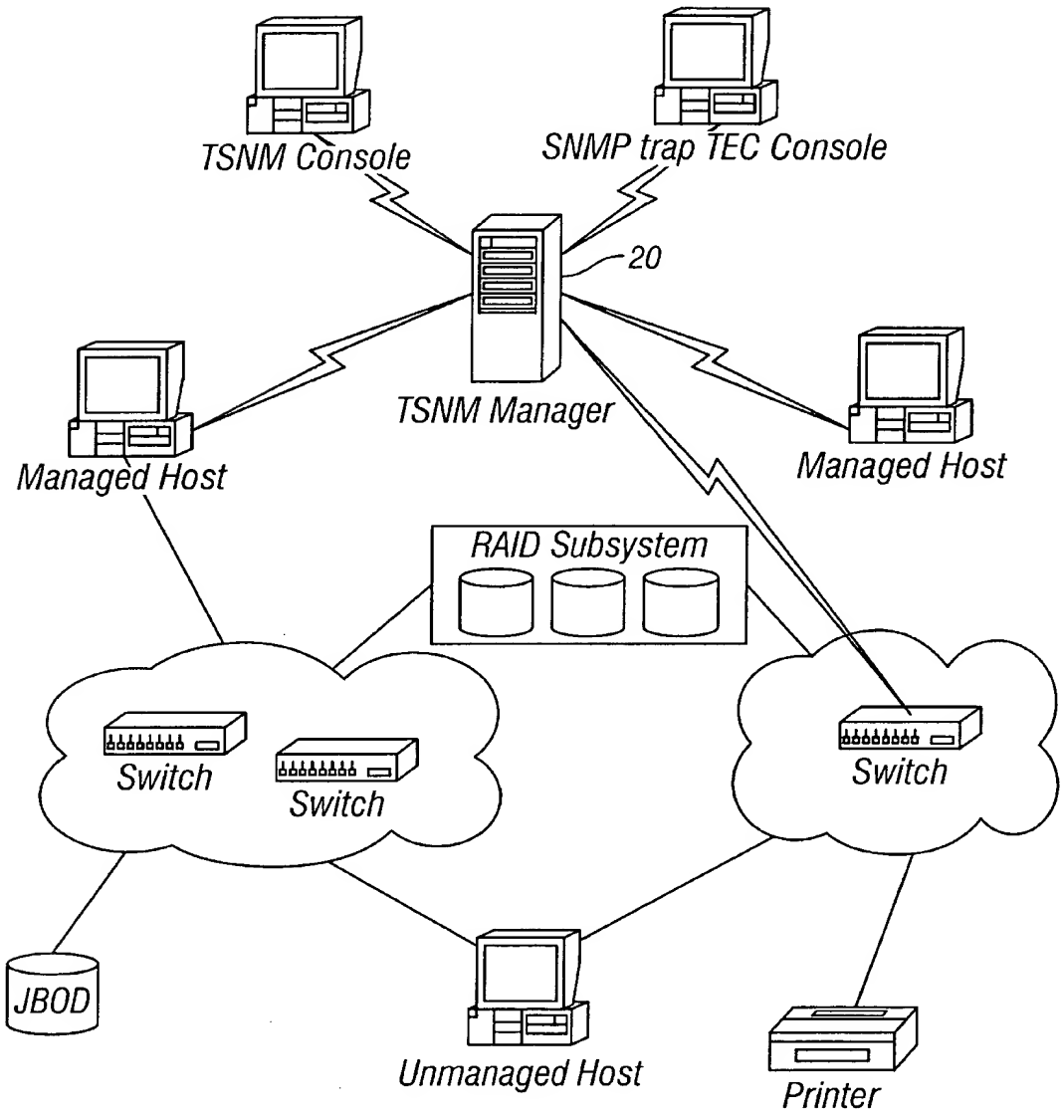
TSNM Console
SNMP trap TEC Console
20
TSNM Manager
Managed Host
Managed Host
RAID Subsystem
Switch
Switch
Switch
JBOD
Unmanaged Host
Printer

FIG. 2

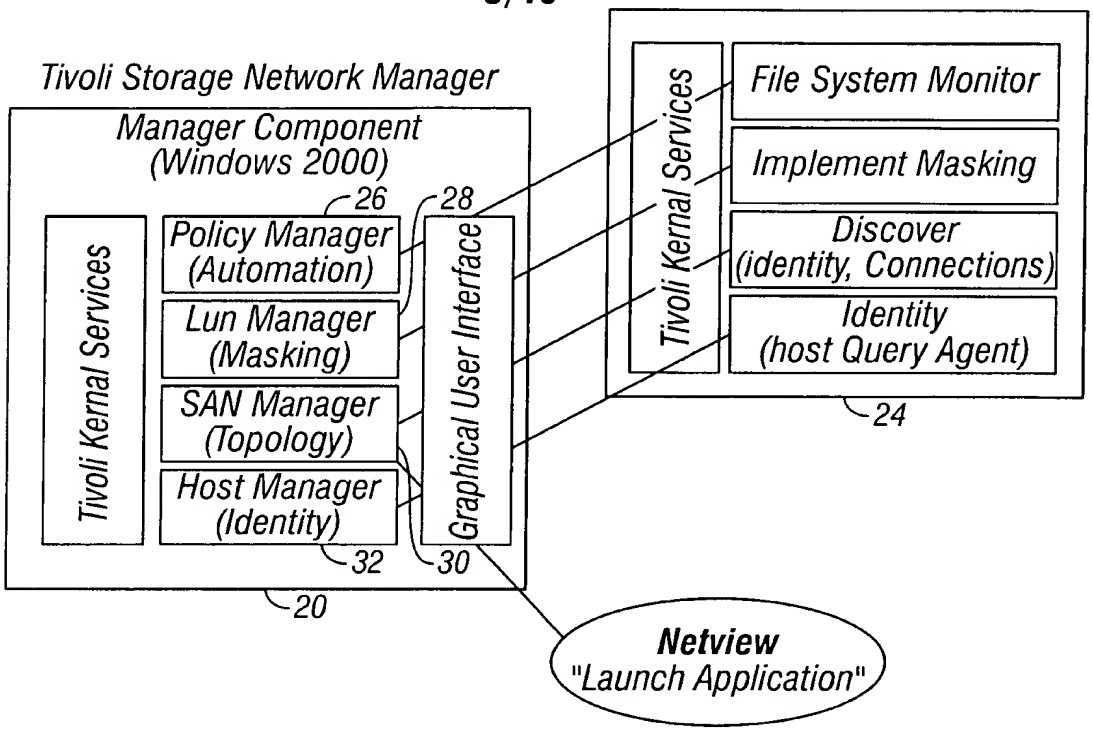
Tivoli Storage Network Manager
Manager Component
(Windows 2000)
Tivoli Kernal Services
Policy Manager
(Automation)
Lun Manager
(Masking)
SAN Manager
(Topology)
Host Manager
(Identity)
Graphical User Interface
26
28
32
30
20
Tivoli Kernal Services
File System Monitor
Implement Masking
Discover
(identity, Connections)
Identity
(host Query Agent)
24
Netview
"Launch Application"

FIG. 3

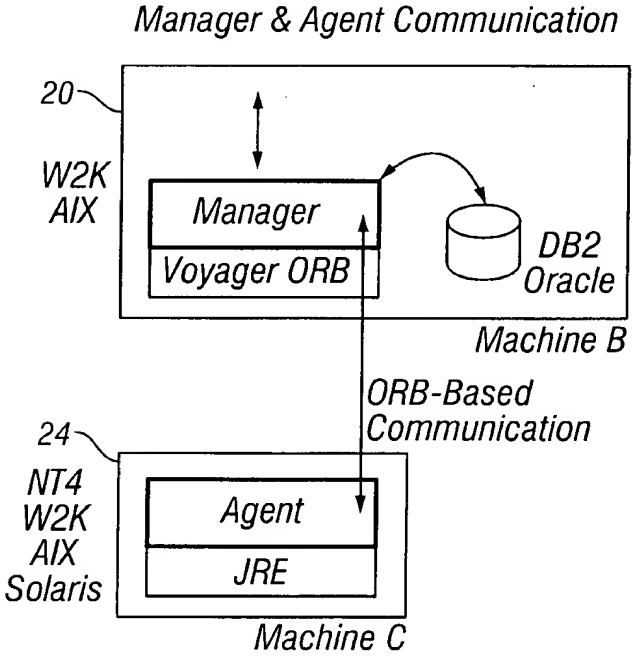
Manager & Agent Communication
20
W2K
AIX
Manager
Voyager ORB
DB2
Oracle
Machine B
ORB-Based
Communication
24
NT4
W2K
AIX
Solaris
Agent
JRE
Machine C

FIG. 4

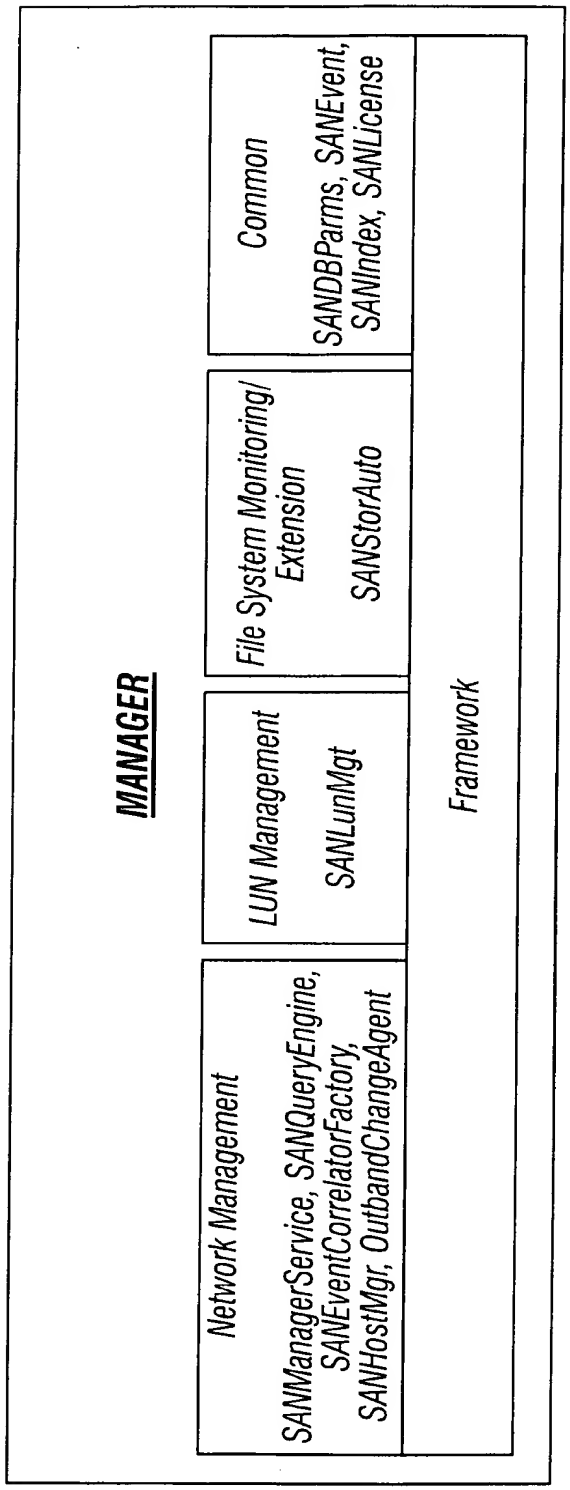
MANAGER
Network Management
SANManagerService, SANQueryEngine, SANEventCorrelatorFactory, SANHostMgr, OutbandChangeAgent
LUN Management
SANLunMgt
File System Monitoring/ Extension
SANStorAuto
Common
SANDBParms, SANEvent, SANIndex, SANLicense
Framework

FIG. 5

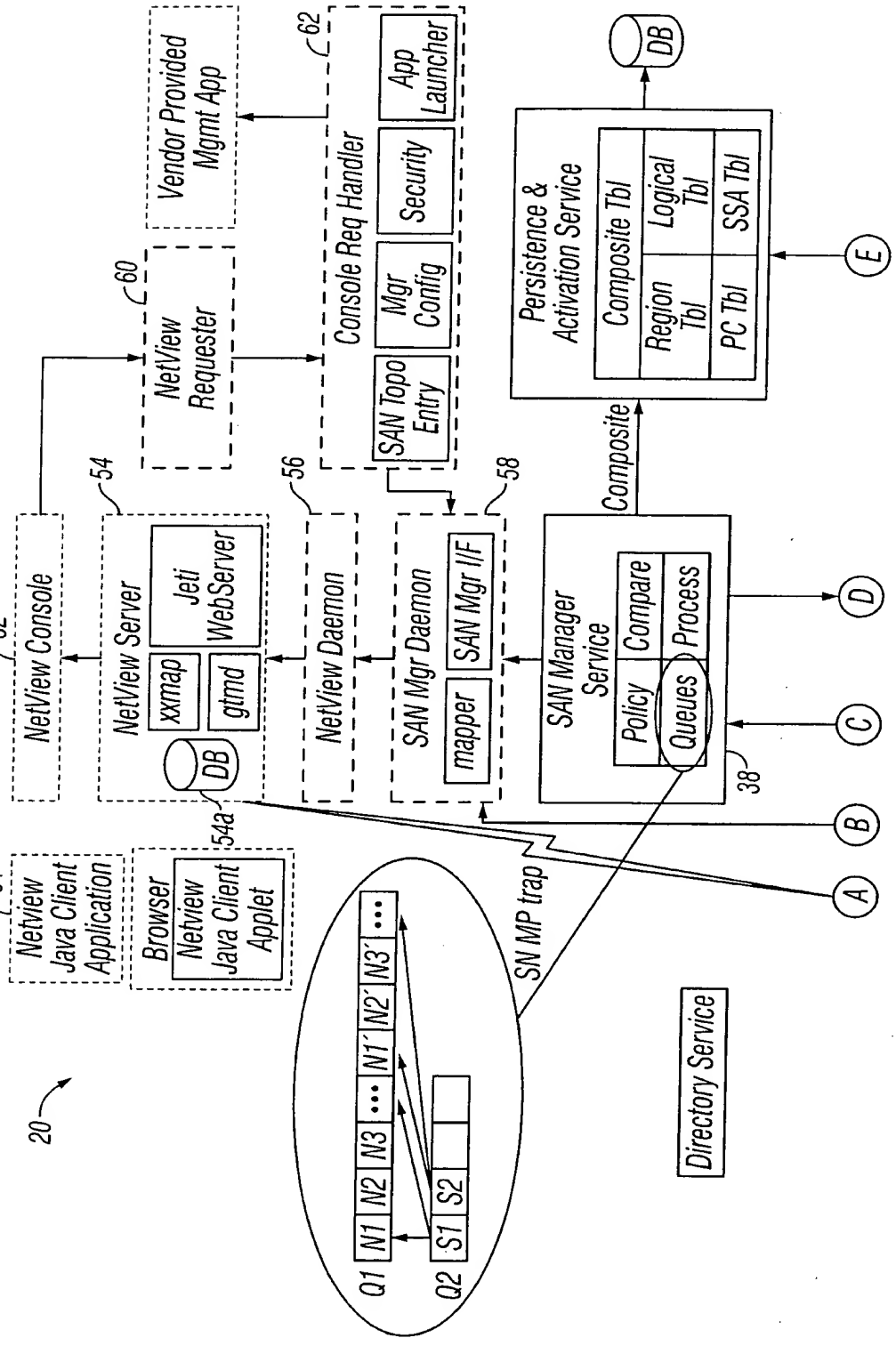
20
NetView Console
52
NetView Server
xxmap
gtmd
Jeti WebServer
DB
54
54a
NetView Daemon
56
SAN Mgr Daemon
mapper
SAN Mgr I/F
58
NetView Requester
60
Console Req Handler
SAN Topo Entry
Mgr Config
Security
App Launcher
62
Vendor Provided Mgmt App
Persistence & Activation Service
Composite Tbl
Region Tbl
PC Tbl
Logical Tbl
SSA Tbl
DB
Composite
SAN Manager Service
Policy
Compare
Process
Queues
38
Netview Java Client Application
64
Browser Netview Java Client Applet
Q1
N1
N2
N3
N1'
N2'
N3'
Q2
S1
S2
SN MP trap
Directory Service
A
B
C
D
E

FIG. 6A

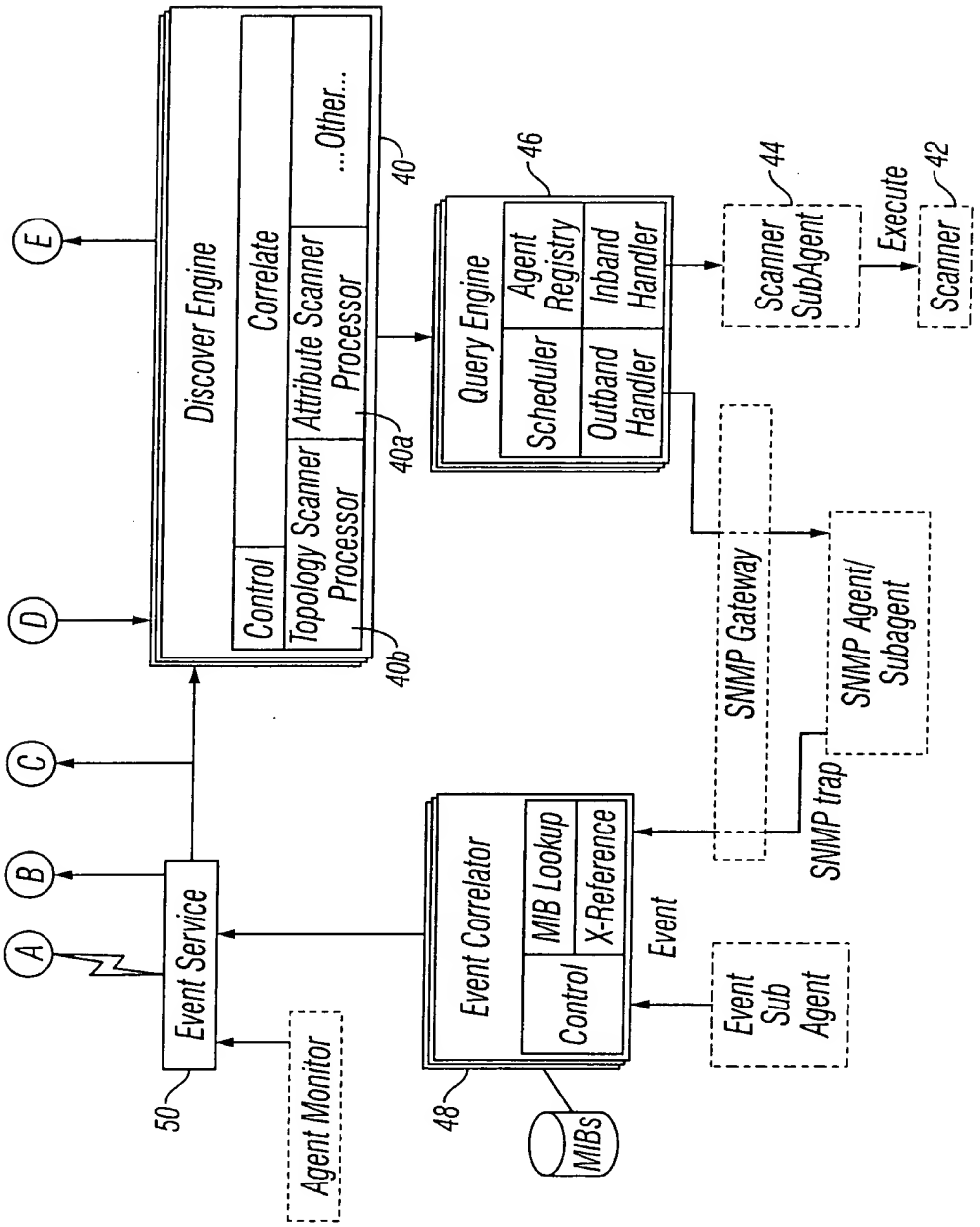
Discover Engine
Control
Topology Scanner Processor
Correlate
Attribute Scanner Processor
...Other...
40
40a
40b
Query Engine
Scheduler
Agent Registry
Outband Handler
Inband Handler
46
Scanner SubAgent
44
Execute
Scanner
42
SNMP Gateway
SNMP Agent/ Subagent
SNMP trap
Event Service
Agent Monitor
50
Event Correlator
Control
MIB Lookup
X-Reference
MIBs
48
Event
Event Sub Agent
A
B
C
D
E

FIG. 6B

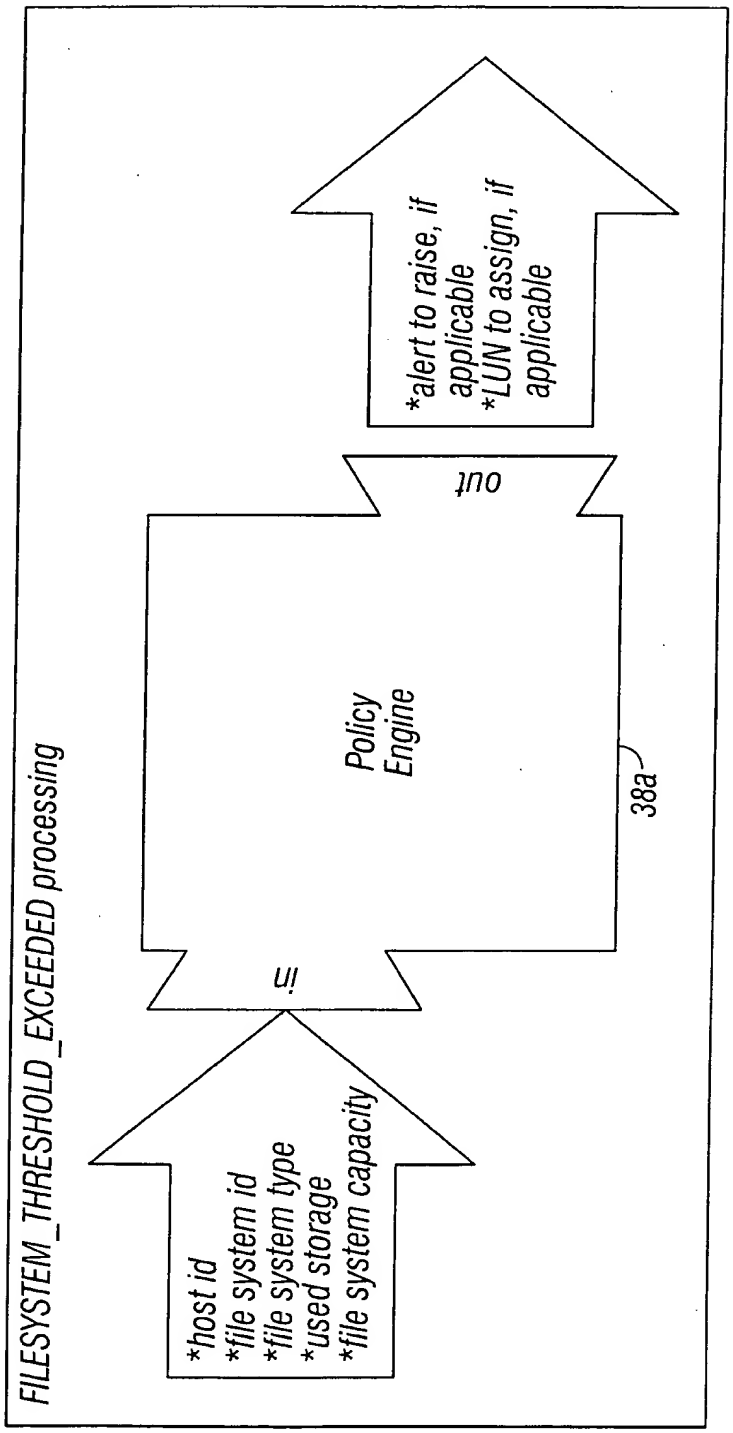
FILESYSTEM_THRESHOLD_EXCEEDED processing
*host id
*file system id
*file system type
*used storage
*file system capacity
in
Policy Engine
38a
out
*alert to raise, if applicable
*LUN to assign, if applicable

FIG. 7A

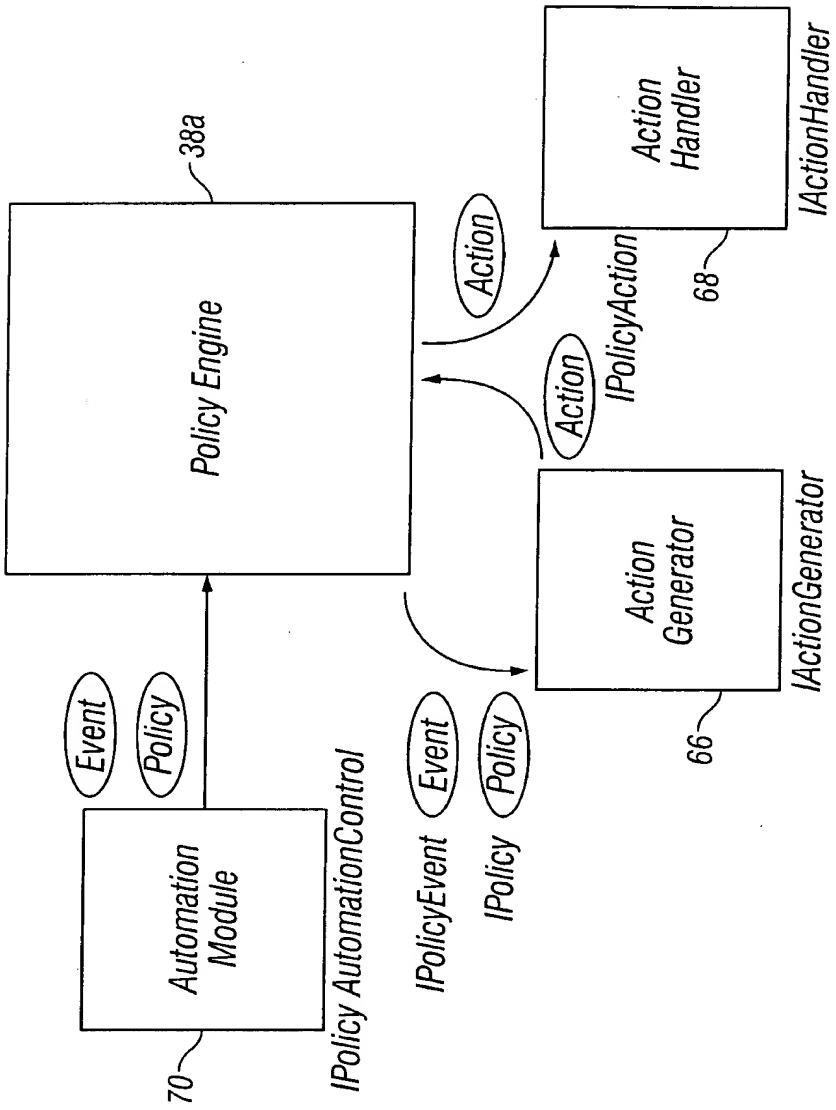
Automation Module
70
IPolicy AutomationControl
Event
Policy
Policy Engine
38a
IPolicyEvent
IPolicy
Action Generator
66
IActionGenerator
Action
IPolicyAction
Action Handler
68
IActionHandler

FIG. 7B

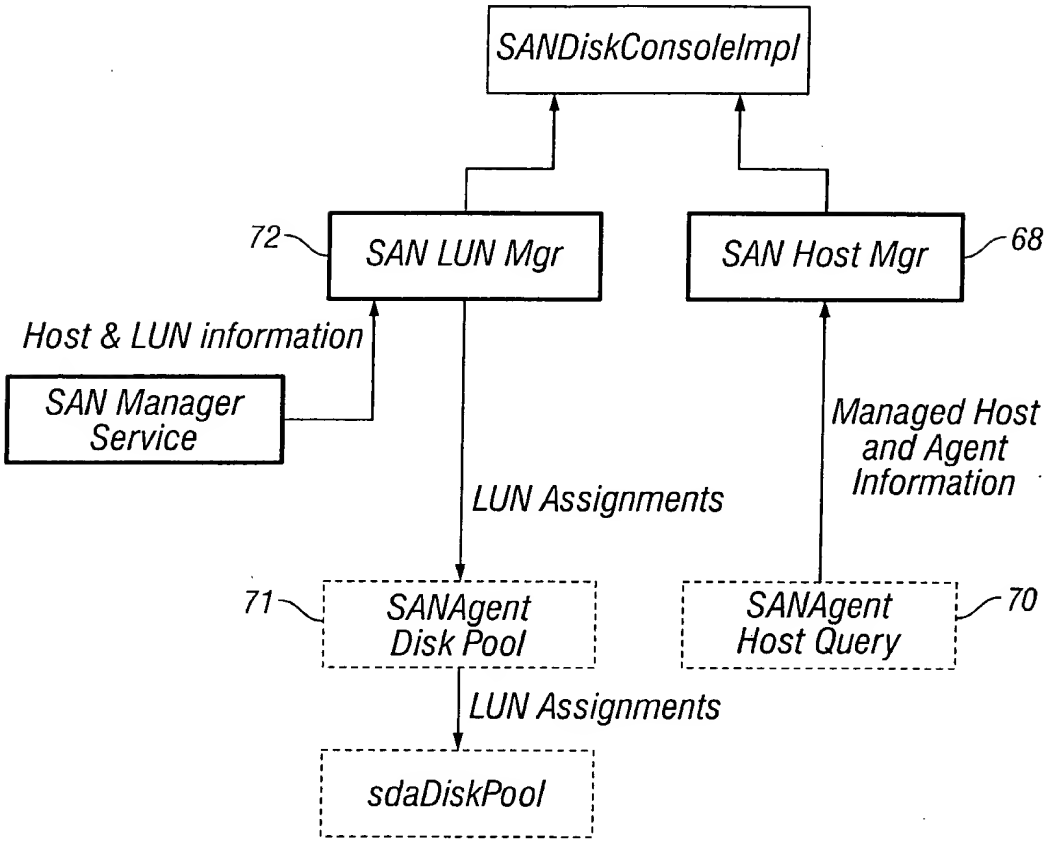
SANDiskConsoleImpl
72
SAN LUN Mgr
SAN Host Mgr
68
Host & LUN information
SAN Manager Service
LUN Assignments
Managed Host and Agent Information
71
SANAgent Disk Pool
SANAgent Host Query
70
LUN Assignments
sdaDiskPool

FIG. 8

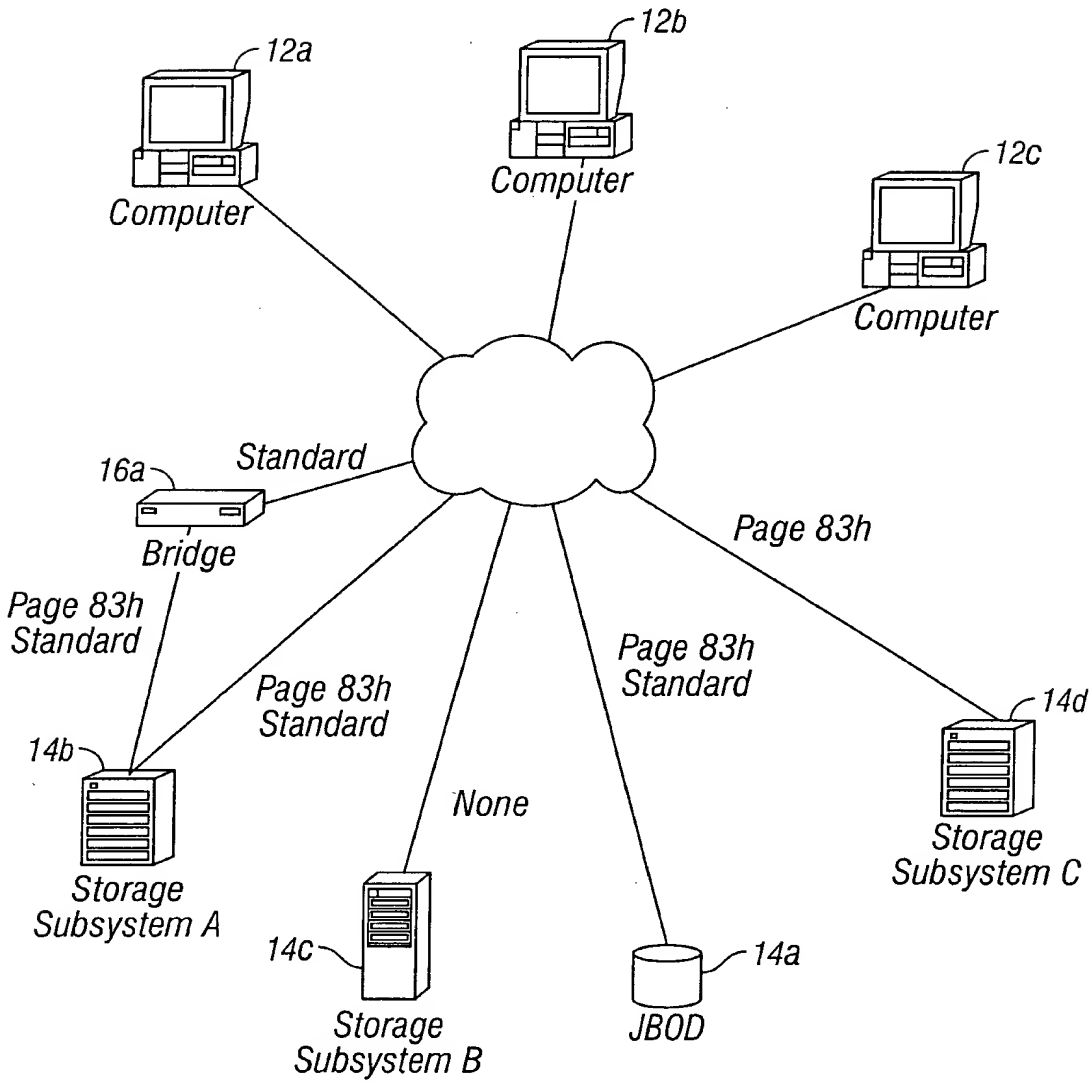
12a
Computer
12b
Computer
12c
Computer
16a
Bridge
Standard
Page 83h
Page 83h
Standard
Page 83h
Standard
Page 83h
Standard
None
14b
Storage
Subsystem A
14c
Storage
Subsystem B
14a
JBOD
14d
Storage
Subsystem C

FIG. 9

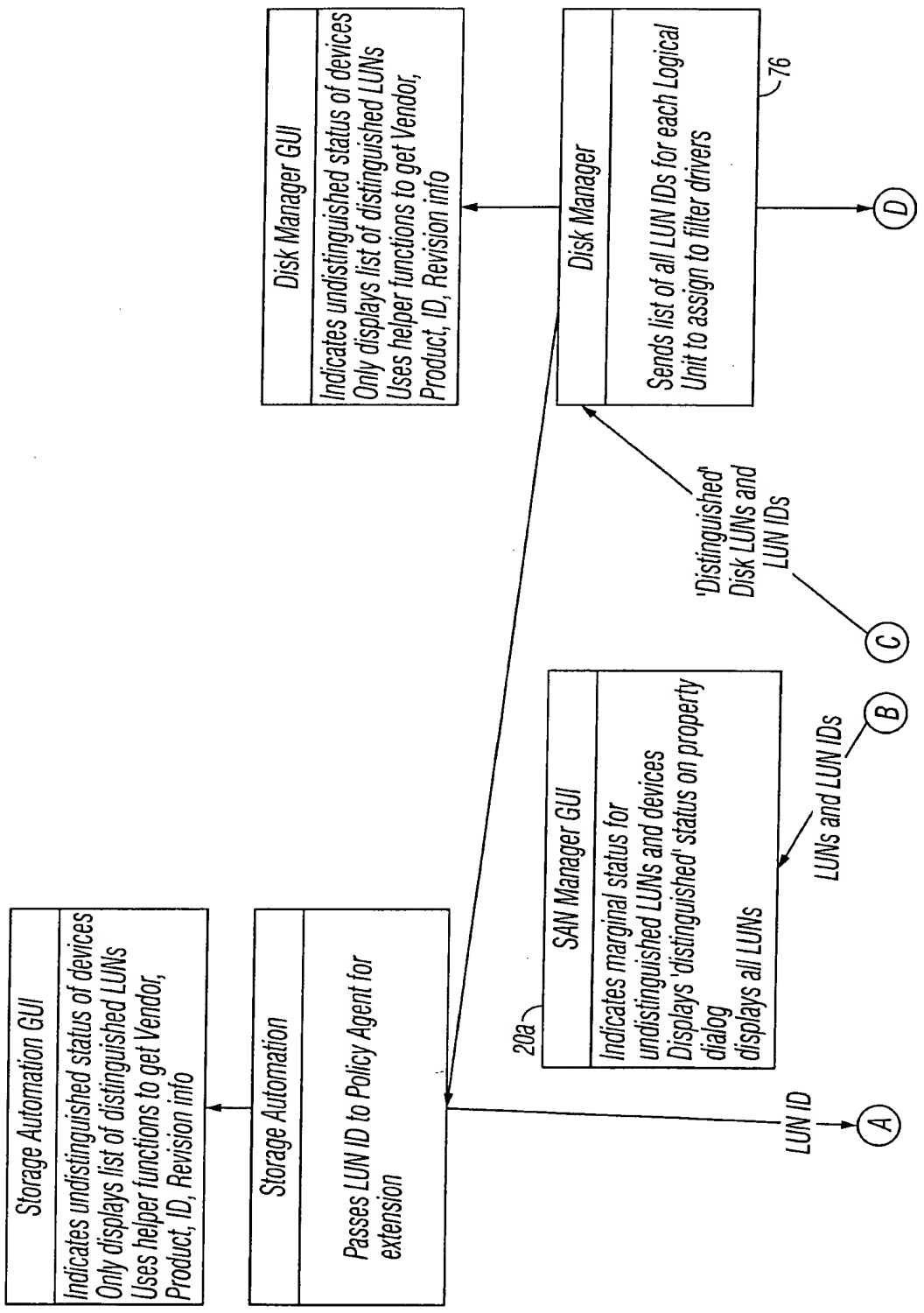
Storage Automation GUI
Indicates undistinguished status of devices
Only displays list of distinguished LUNs
Uses helper functions to get Vendor, Product, ID, Revision info
Storage Automation
Passes LUN ID to Policy Agent for extension
LUN ID
A
SAN Manager GUI
Indicates marginal status for undistinguished LUNs and devices
Displays 'distinguished' status on property dialog
displays all LUNs
20a
LUNs and LUN IDs
B
'Distinguished' Disk LUNs and LUN IDs
C
Disk Manager
Sends list of all LUN IDs for each Logical Unit to assign to filter drivers
76
D
Disk Manager GUI
Indicates undistinguished status of devices
Only displays list of distinguished LUNs
Uses helper functions to get Vendor, Product, ID, Revision info

FIG. 10A

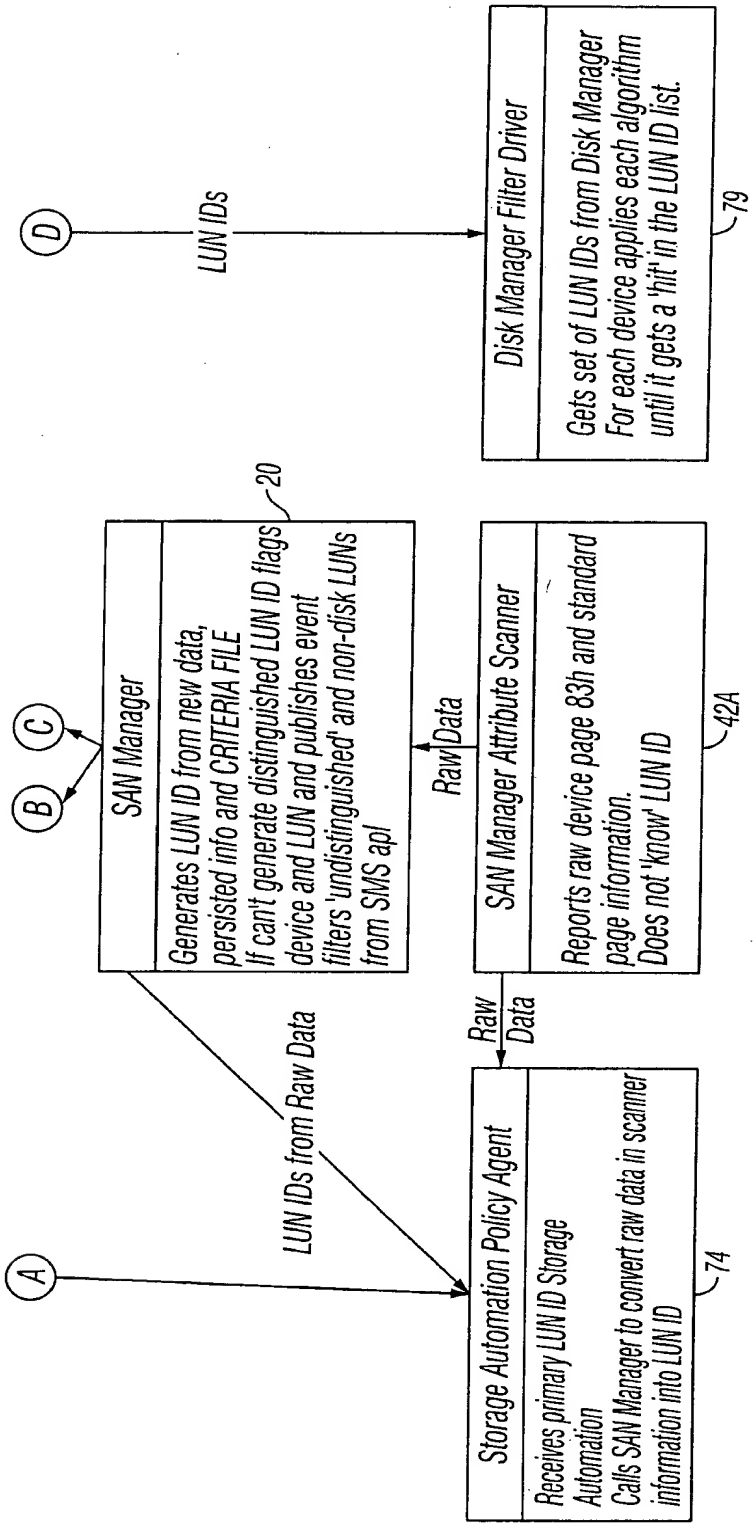
A
B
C
D
LUN IDs from Raw Data
LUN IDs
Raw Data
Raw Data
SAN Manager
Generates LUN ID from new data, persisted info and CRITERIA FILE
If can't generate distinguished LUN ID flags device and LUN and publishes event filters 'undistinguished' and non-disk LUNs from SMS api
20
SAN Manager Attribute Scanner
Reports raw device page 83h and standard page information.
Does not 'know' LUN ID
42A
Storage Automation Policy Agent
Receives primary LUN ID Storage Automation
Calls SAN Manager to convert raw data in scanner information into LUN ID
74
Disk Manager Filter Driver
Gets set of LUN IDs from Disk Manager
For each device applies each algorithm until it gets a 'hit' in the LUN ID list.
79

FIG. 10B

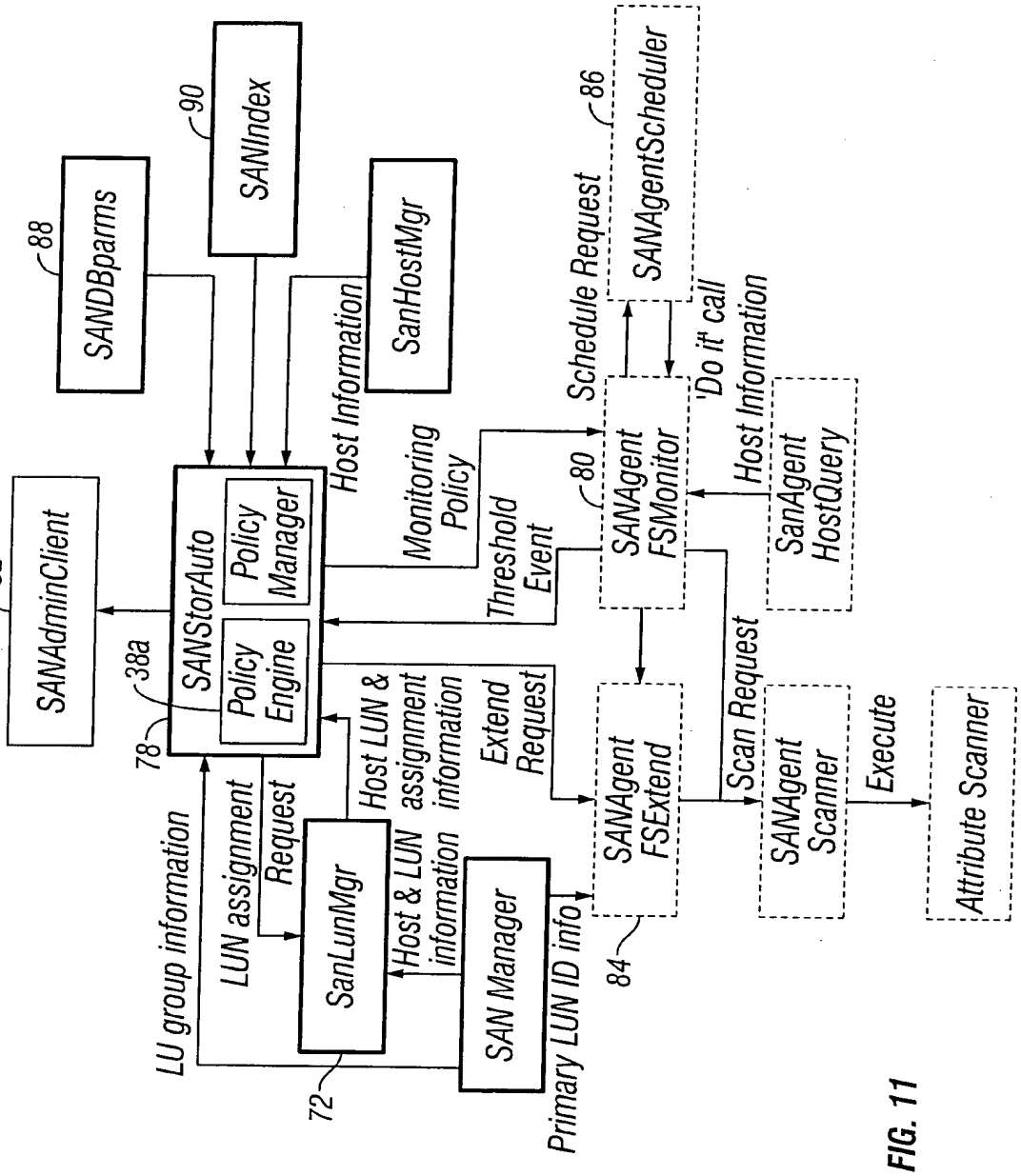
SANDBparms
88
SANIndex
90
SanHostMgr
Host Information
SANAdminClient
82
SANStorAuto
Policy Manager
Policy Engine
38a
78
Monitoring Policy
Threshold Event
Schedule Request
SANAgentScheduler
86
SANAgent FSMonitor
80
'Do it' call
Host Information
SanAgent HostQuery
Extend Request
Scan Request
SANAgent FSExtend
SANAgent Scanner
Execute
Attribute Scanner
LU group information
LUN assignment Request
Host LUN & assignment information
SanLunMgr
Host & LUN information
SAN Manager
Primary LUN ID info
72
84

FIG. 11

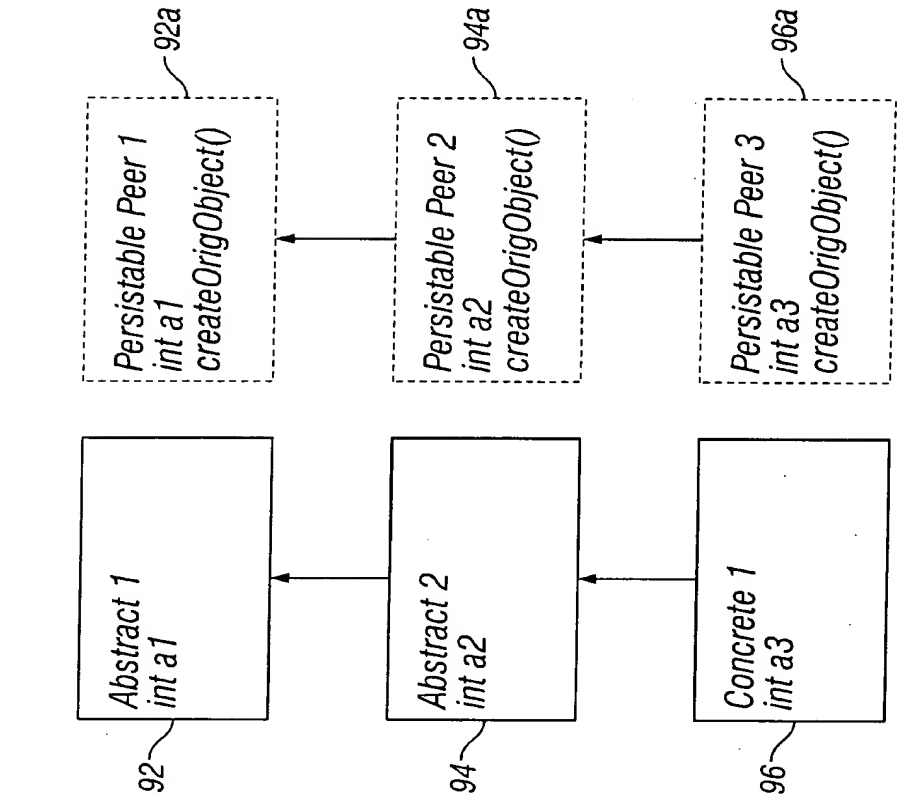
92a
94a
96a
Persistable Peer 1
int a1
createOrigObject()
Persistable Peer 2
int a2
createOrigObject()
Persistable Peer 3
int a3
createOrigObject()
Abstract 1
int a1
Abstract 2
int a2
Concrete 1
int a3
92
94
96

FIG. 13

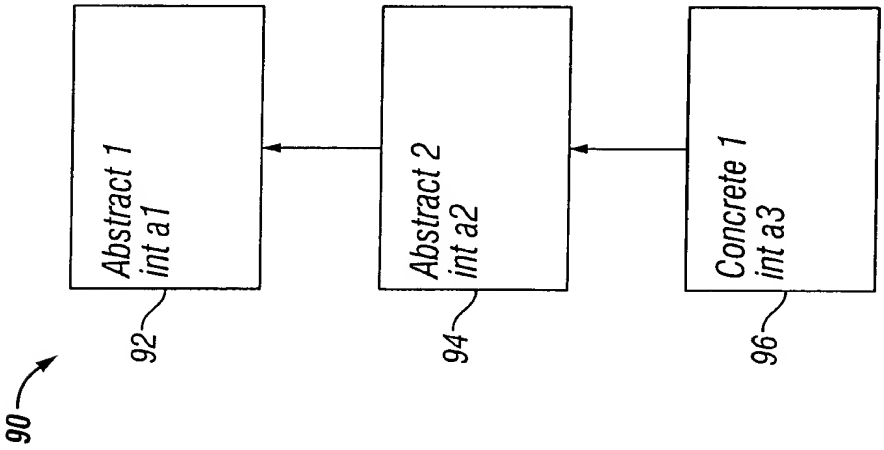
Abstract 1
int a1
Abstract 2
int a2
Concrete 1
int a3
92
94
96
90

FIG. 12

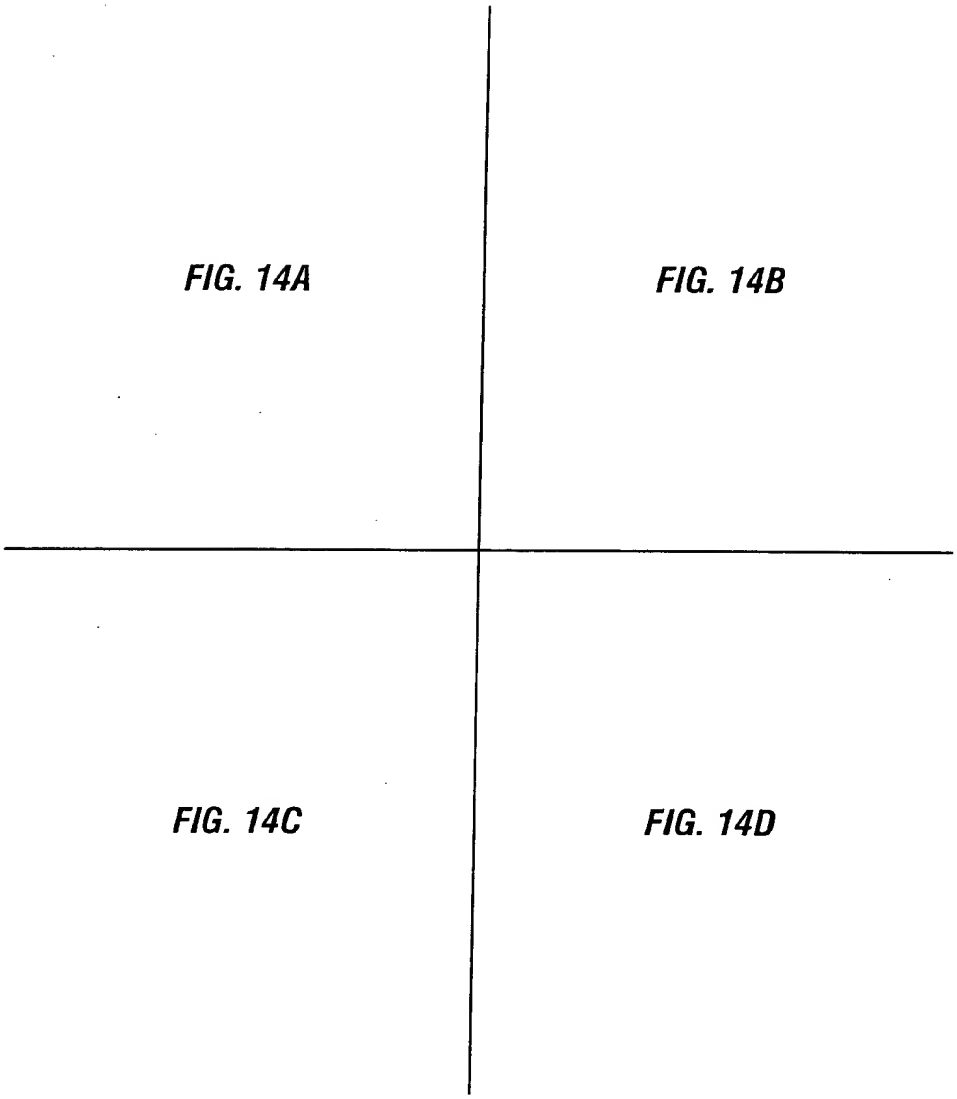

FIG. 14

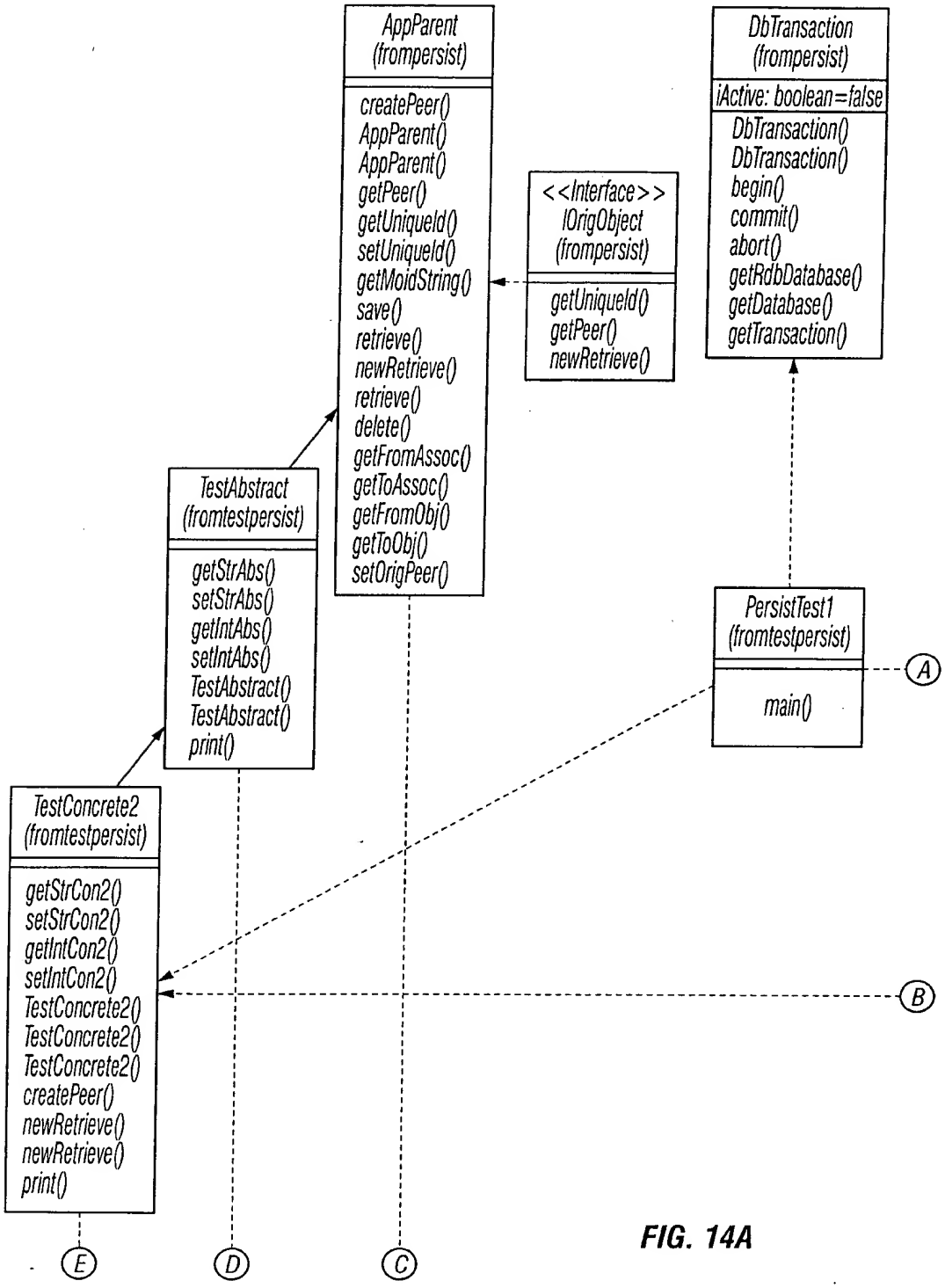
AppParent
(frompersist)
createPeer()
AppParent()
AppParent()
getPeer()
getUniqueId()
setUniqueId()
getMoidString()
save()
retrieve()
newRetrieve()
retrieve()
delete()
getFromAssoc()
getToAssoc()
getFromObj()
getToObj()
setOrigPeer()
<<Interface>>
IOrigObject
(frompersist)
getUniqueId()
getPeer()
newRetrieve()
DbTransaction
(frompersist)
iActive: boolean=false
DbTransaction()
DbTransaction()
begin()
commit()
abort()
getRdbDatabase()
getDatabase()
getTransaction()
TestAbstract
(fromtestpersist)
getStrAbs()
setStrAbs()
getIntAbs()
setIntAbs()
TestAbstract()
TestAbstract()
print()
PersistTest1
(fromtestpersist)
main()
A
TestConcrete2
(fromtestpersist)
getStrCon2()
setStrCon2()
getIntCon2()
setIntCon2()
TestConcrete2()
TestConcrete2()
TestConcrete2()
createPeer()
newRetrieve()
newRetrieve()
print()
B
E
D
C

FIG. 14A

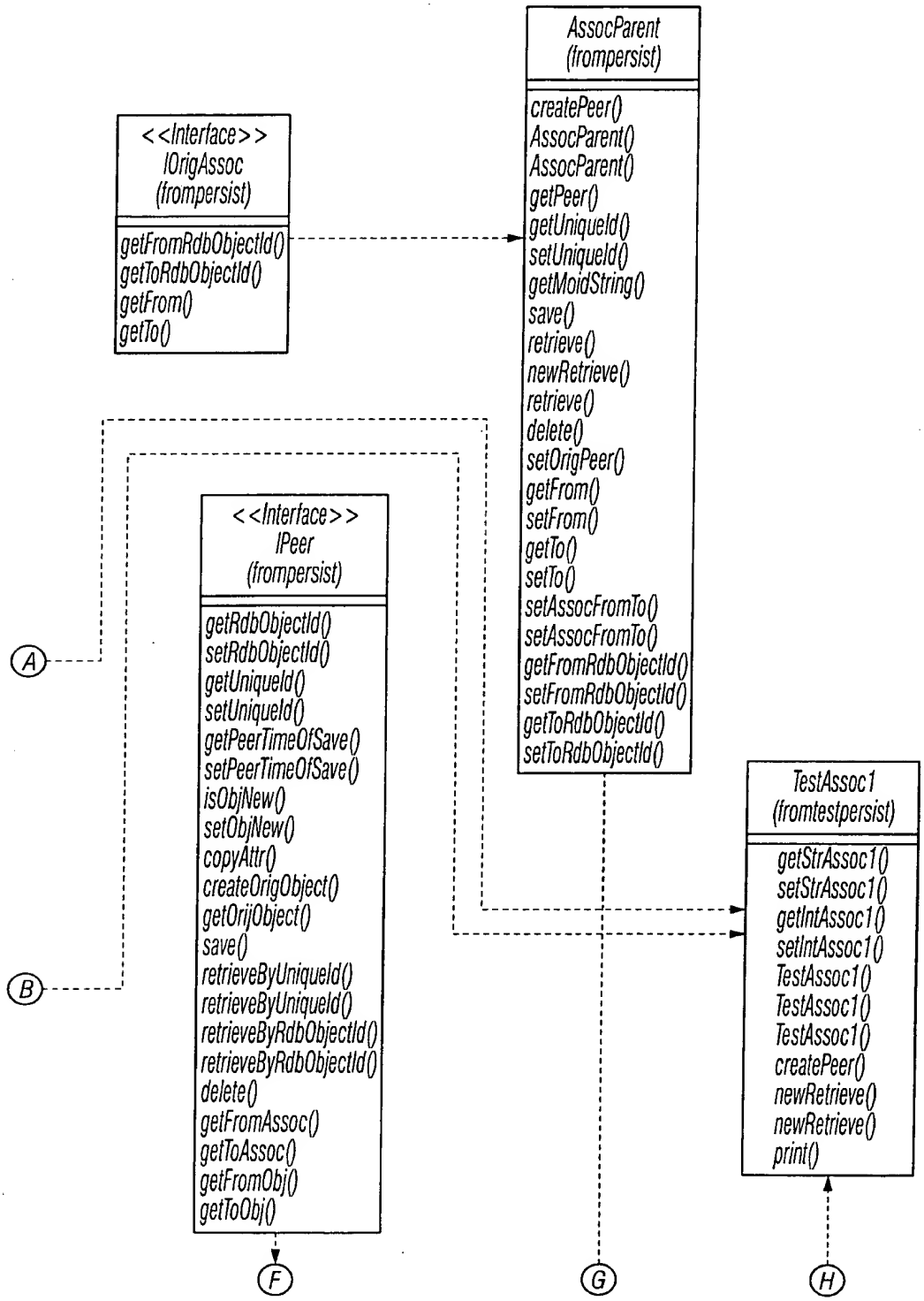
<<Interface>>
IOrigAssoc
(frompersist)
getFromRdbObjectId()
getToRdbObjectId()
getFrom()
getTo()
AssocParent
(frompersist)
createPeer()
AssocParent()
AssocParent()
getPeer()
getUniqueId()
setUniqueId()
getMoidString()
save()
retrieve()
newRetrieve()
retrieve()
delete()
setOrigPeer()
getFrom()
setFrom()
getTo()
setTo()
setAssocFromTo()
setAssocFromTo()
getFromRdbObjectId()
setFromRdbObjectId()
getToRdbObjectId()
setToRdbObjectId()
<<Interface>>
IPeer
(frompersist)
getRdbObjectId()
setRdbObjectId()
getUniqueId()
setUniqueId()
getPeerTimeOfSave()
setPeerTimeOfSave()
isObjNew()
setObjNew()
copyAttr()
createOrigObject()
getOrijObject()
save()
retrieveByUniqueId()
retrieveByUniqueId()
retrieveByRdbObjectId()
retrieveByRdbObjectId()
delete()
getFromAssoc()
getToAssoc()
getFromObj()
getToObj()
TestAssoc1
(fromtestpersist)
getStrAssoc1()
setStrAssoc1()
getIntAssoc1()
setIntAssoc1()
TestAssoc1()
TestAssoc1()
TestAssoc1()
createPeer()
newRetrieve()
newRetrieve()
print()
A
B
F
G
H

FIG. 14B

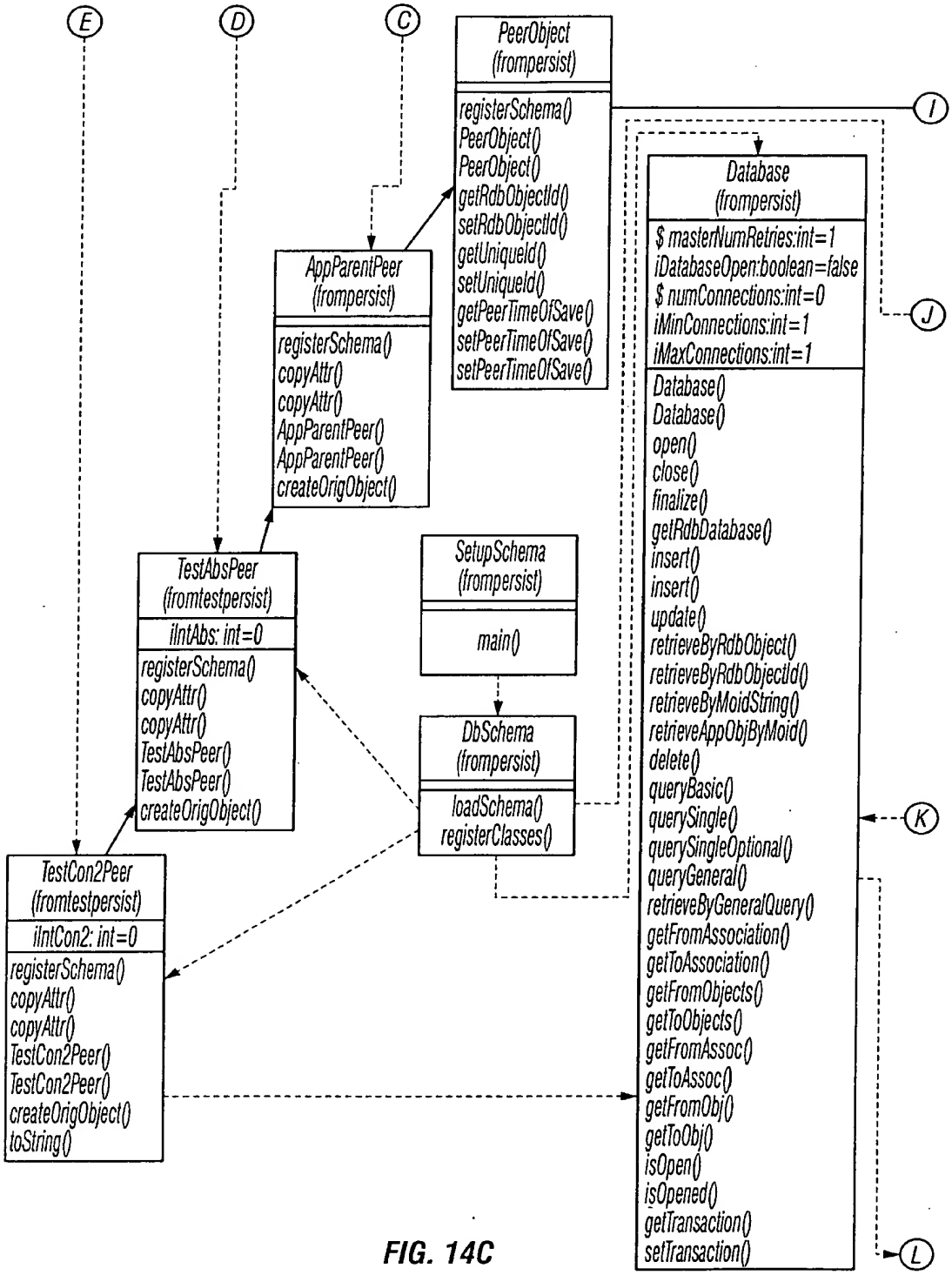
E
D
C
PeerObject
(frompersist)
registerSchema()
PeerObject()
PeerObject()
getRdbObjectId()
setRdbObjectId()
getUniqueId()
setUniqueId()
getPeerTimeOfSave()
setPeerTimeOfSave()
setPeerTimeOfSave()
I
Database
(frompersist)
$ masterNumRetries:int=1
iDatabaseOpen:boolean=false
$ numConnections:int=0
iMinConnections:int=1
iMaxConnections:int=1
Database()
Database()
open()
close()
finalize()
getRdbDatabase()
insert()
insert()
update()
retrieveByRdbObject()
retrieveByRdbObjectId()
retrieveByMoidString()
retrieveAppObjByMoid()
delete()
queryBasic()
querySingle()
querySingleOptional()
queryGeneral()
retrieveByGeneralQuery()
getFromAssociation()
getToAssociation()
getFromObjects()
getToObjects()
getFromAssoc()
getToAssoc()
getFromObj()
getToObj()
isOpen()
isOpened()
getTransaction()
setTransaction()
J
K
L
AppParentPeer
(frompersist)
registerSchema()
copyAttr()
copyAttr()
AppParentPeer()
AppParentPeer()
createOrigObject()
TestAbsPeer
(fromtestpersist)
iIntAbs: int=0
registerSchema()
copyAttr()
copyAttr()
TestAbsPeer()
TestAbsPeer()
createOrigObject()
SetupSchema
(frompersist)
main()
DbSchema
(frompersist)
loadSchema()
registerClasses()
TestCon2Peer
(fromtestpersist)
iIntCon2: int=0
registerSchema()
copyAttr()
copyAttr()
TestCon2Peer()
TestCon2Peer()
createOrigObject()
toString()

FIG. 14C

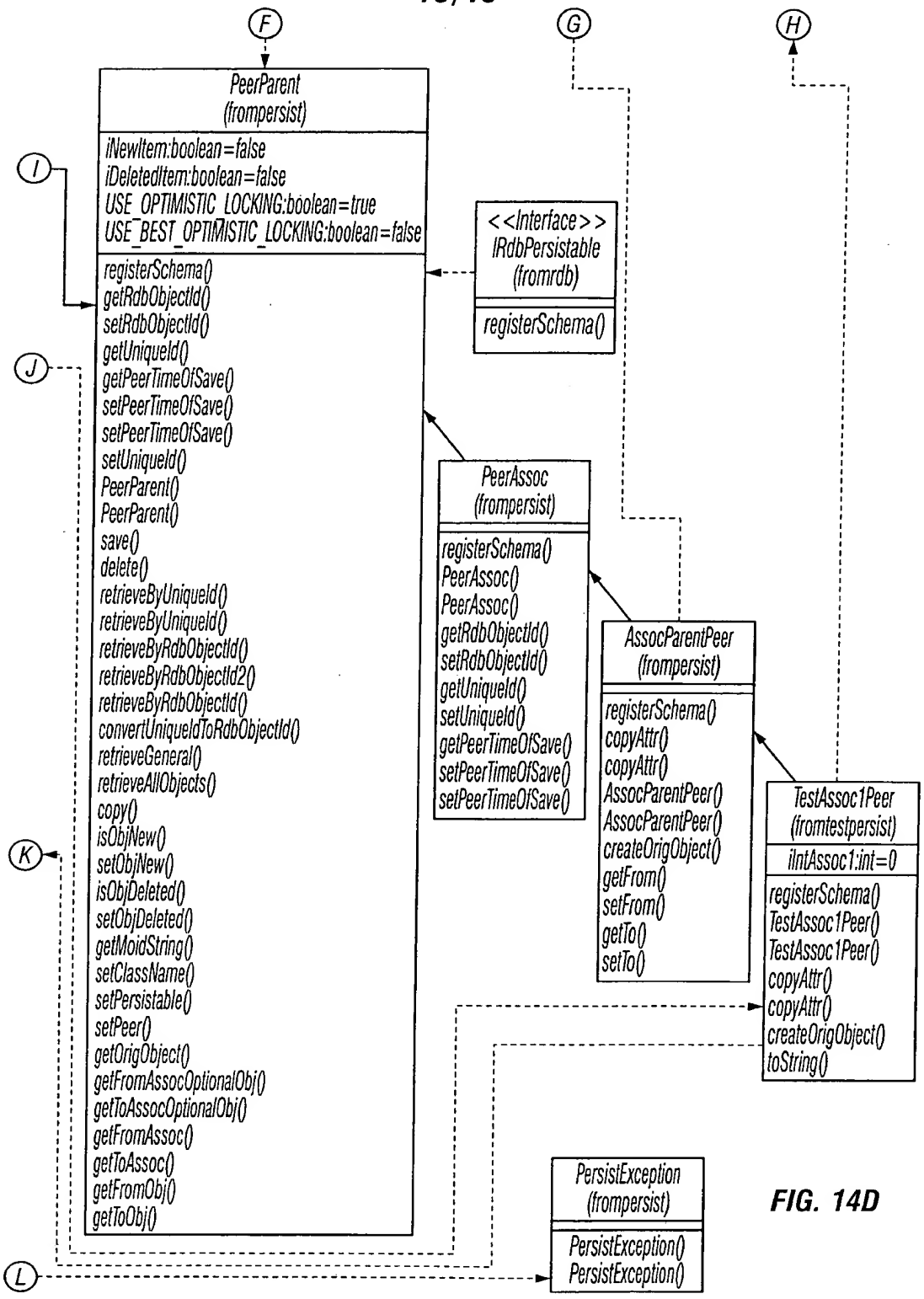
F
G
H
I
J
K
L
PeerParent
(frompersist)
iNewItem:boolean=false
iDeletedItem:boolean=false
USE_OPTIMISTIC_LOCKING:boolean=true
USE_BEST_OPTIMISTIC_LOCKING:boolean=false
registerSchema()
getRdbObjectId()
setRdbObjectId()
getUniqueId()
getPeerTimeOfSave()
setPeerTimeOfSave()
setPeerTimeOfSave()
setUniqueId()
PeerParent()
PeerParent()
save()
delete()
retrieveByUniqueId()
retrieveByUniqueId()
retrieveByRdbObjectId()
retrieveByRdbObjectId2()
retrieveByRdbObjectId()
convertUniqueIdToRdbObjectId()
retrieveGeneral()
retrieveAllObjects()
copy()
isObjNew()
setObjNew()
isObjDeleted()
setObjDeleted()
getMoidString()
setClassName()
setPersistable()
setPeer()
getOrigObject()
getFromAssocOptionalObj()
getToAssocOptionalObj()
getFromAssoc()
getToAssoc()
getFromObj()
getToObj()
<<Interface>>
IRdbPersistable
(fromrdb)
registerSchema()
PeerAssoc
(frompersist)
registerSchema()
PeerAssoc()
PeerAssoc()
getRdbObjectId()
setRdbObjectId()
getUniqueId()
setUniqueId()
getPeerTimeOfSave()
setPeerTimeOfSave()
setPeerTimeOfSave()
AssocParentPeer
(frompersist)
registerSchema()
copyAttr()
copyAttr()
AssocParentPeer()
AssocParentPeer()
createOrigObject()
getFrom()
setFrom()
getTo()
setTo()
TestAssoc1Peer
(fromtestpersist)
iIntAssoc1:int=0
registerSchema()
TestAssoc1Peer()
TestAssoc1Peer()
copyAttr()
copyAttr()
createOrigObject()
toString()
PersistException
(frompersist)
PersistException()
PersistException()

FIG. 14D

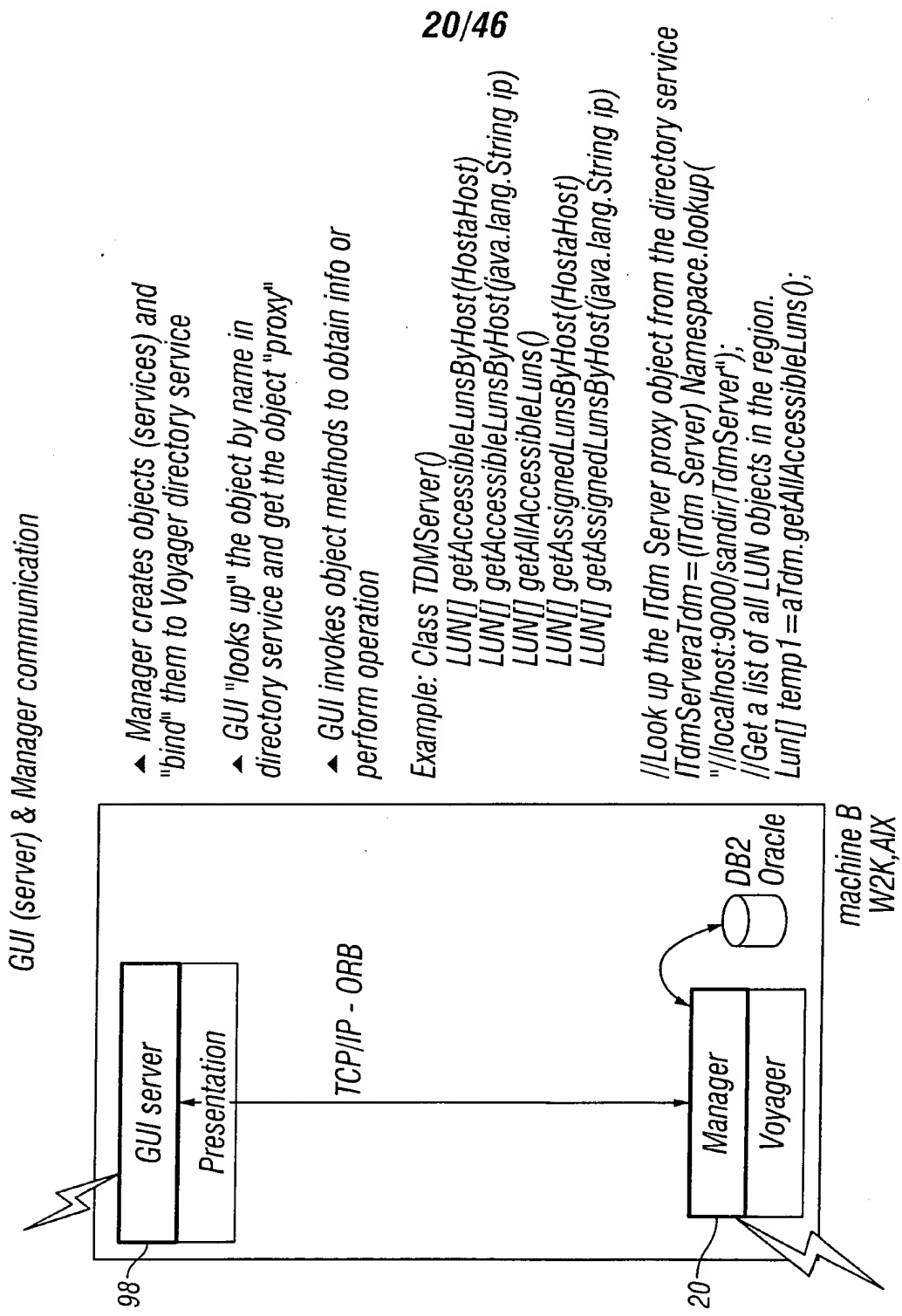
GUI (server) & Manager communication
▲ Manager creates objects (services) and "bind" them to Voyager directory service
▲ GUI "looks up" the object by name in directory service and get the object "proxy"
▲ GUI invokes object methods to obtain info or perform operation
Example: Class TDMServer()
LUN[] getAccessibleLunsByHost(HostaHost)
LUN[] getAccessibleLunsByHost(java.lang.String ip)
LUN[] getAllAccessibleLuns()
LUN[] getAssignedLunsByHost(HostaHost)
LUN[] getAssignedLunsByHost(java.lang.String ip)
//Look up the ITdm Server proxy object from the directory service
ITdmServeraTdm=(ITdm Server) Namespace.lookup(
"//localhost:9000/sandir/TdmServer");
//Get a list of all LUN objects in the region.
Lun[] temp1=aTdm.getAllAccessibleLuns();
GUI server
Presentation
TCP/IP - ORB
Manager
Voyager
DB2
Oracle
machine B
W2K,AIX
98
20

FIG. 15

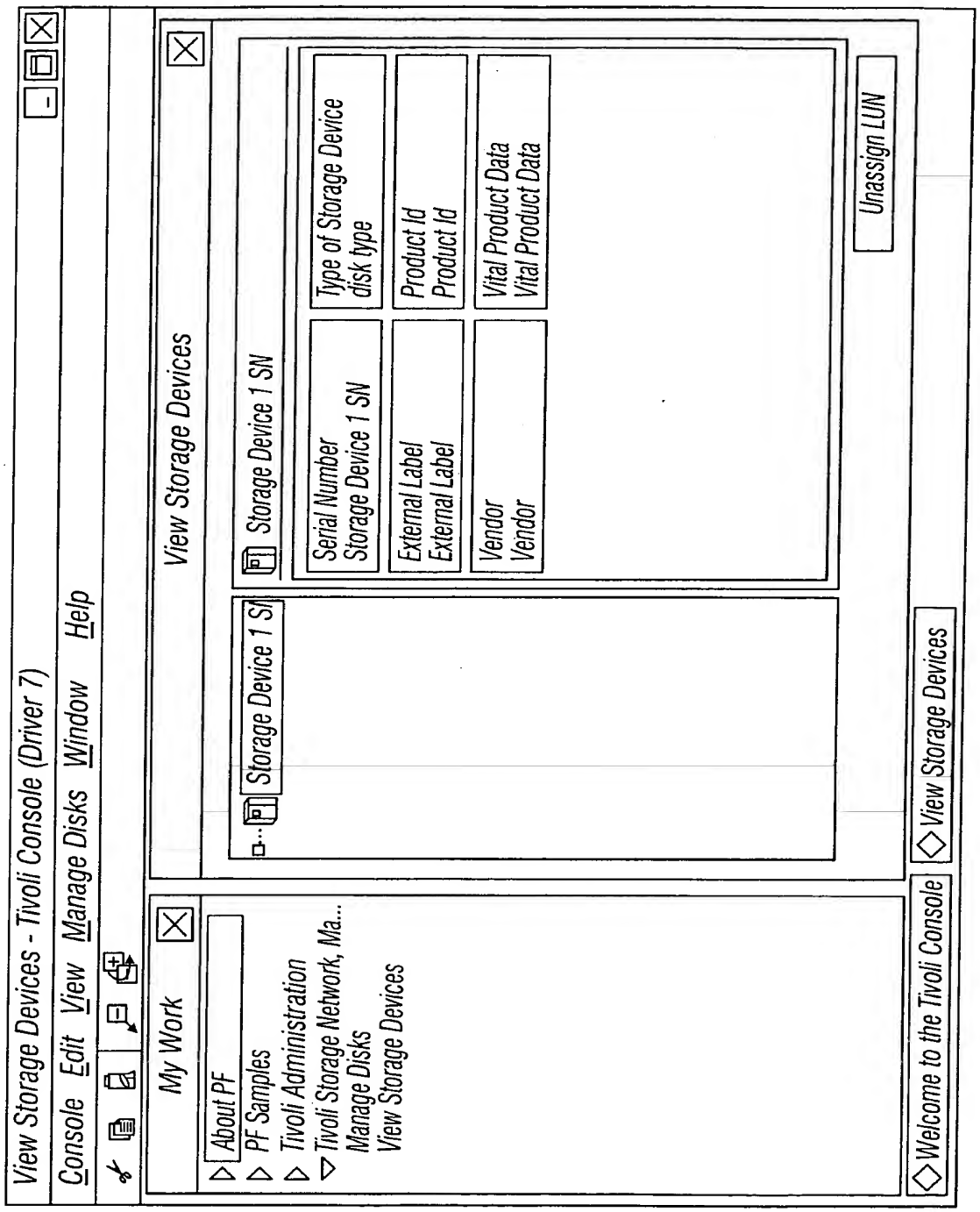
100
View Storage Devices - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
My Work
About PF
PF Samples
Tivoli Administration
Tivoli Storage Network, Ma...
Manage Disks
View Storage Devices
View Storage Devices
Storage Device 1 SN
Storage Device 1 SN
Serial Number
Storage Device 1 SN
External Label
External Label
Vendor
Vendor
Type of Storage Device
disk type
Product Id
Product Id
Vital Product Data
Vital Product Data
Unassign LUN
Welcome to the Tivoli Console
View Storage Devices

FIG. 16

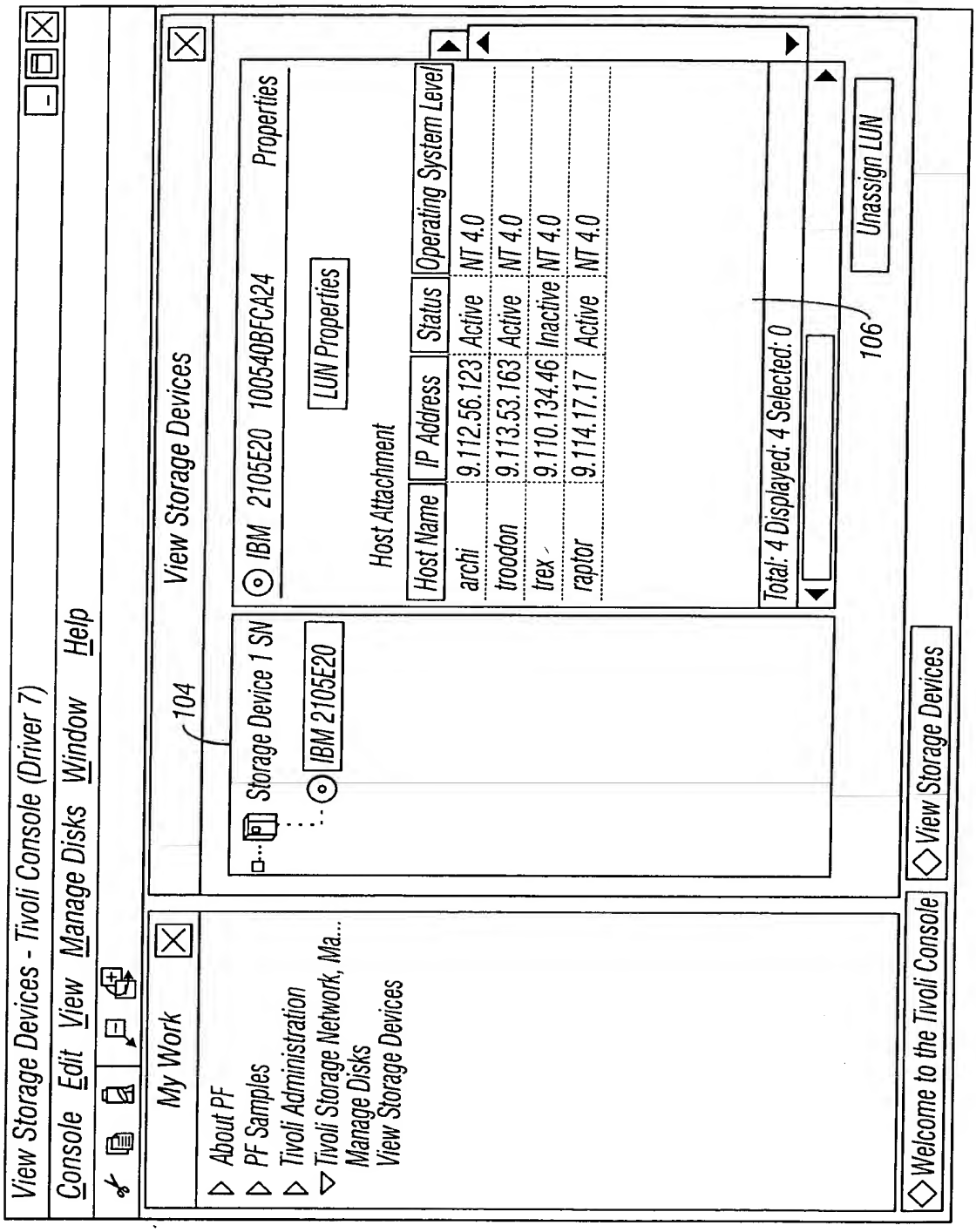
View Storage Devices - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
My Work
About PF
PF Samples
Tivoli Administration
Tivoli Storage Network, Ma...
Manage Disks
View Storage Devices
102
104
View Storage Devices
Storage Device 1 SN
IBM 2105E20
IBM 2105E20 100540BFCA24
Properties
LUN Properties
Host Attachment
Host Name
IP Address
Status
Operating System Level
archi
9.112.56.123
Active
NT 4.0
troodon
9.113.53.163
Active
NT 4.0
trex
9.110.134.46
Inactive
NT 4.0
raptor
9.114.17.17
Active
NT 4.0
Total: 4 Displayed: 4 Selected: 0
106
Unassign LUN
Welcome to the Tivoli Console
View Storage Devices

FIG. 17

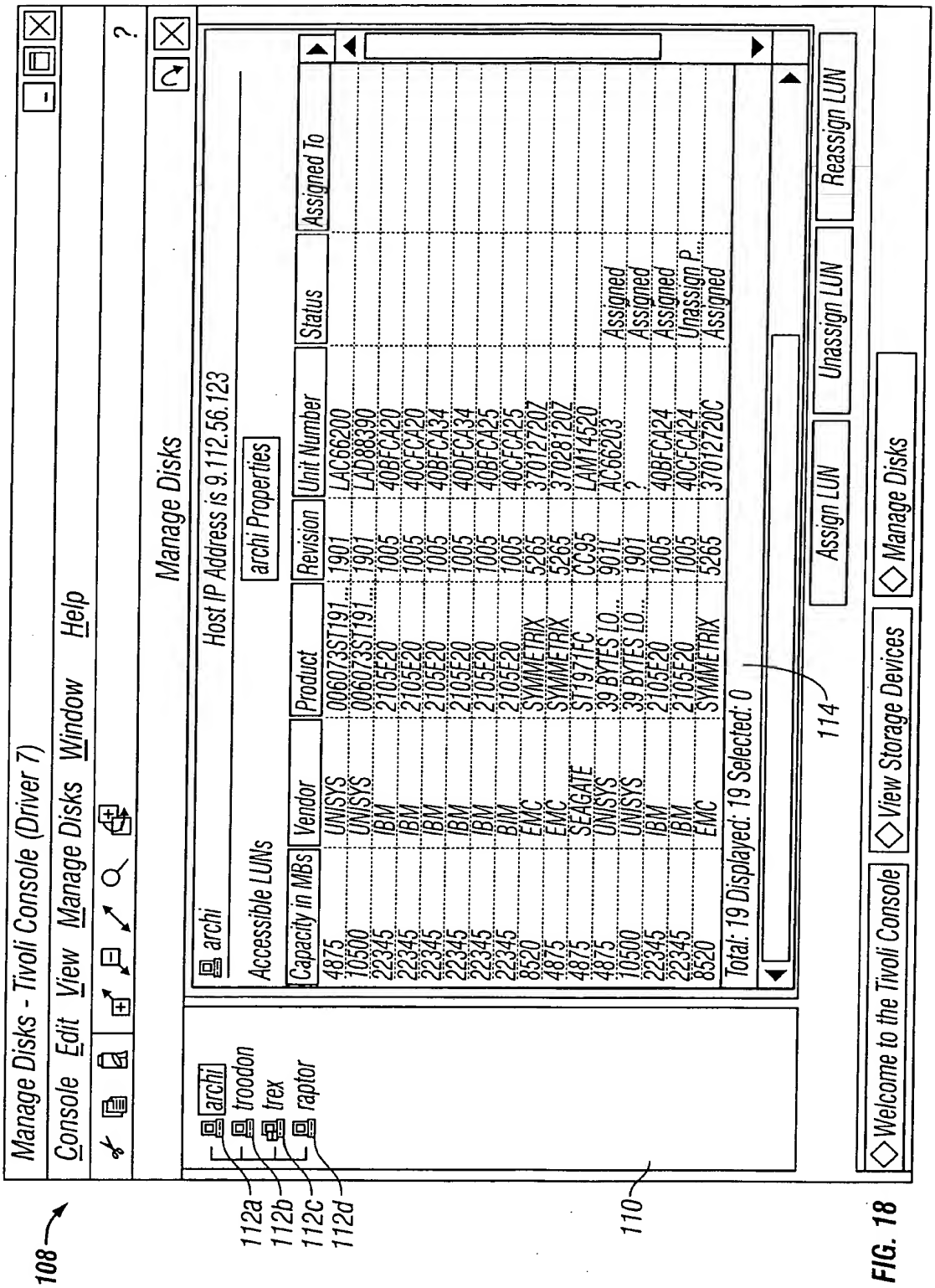
Manage Disks - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
Manage Disks
archi
Host IP Address is 9.112.56.123
archi Properties
Accessible LUNs
Capacity in MBs | Vendor | Product | Revision | Unit Number | Status | Assigned To
4875 | UNISYS | 006073ST191... | 1901 | LAC66200
10500 | UNISYS | 006073ST191... | 1901 | LAD88390
22345 | IBM | 2105E20 | 1005 | 40BFCA20
22345 | IBM | 2105E20 | 1005 | 40CFCA20
22345 | IBM | 2105E20 | 1005 | 40BFCA34
22345 | IBM | 2105E20 | 1005 | 40DFCA34
22345 | IBM | 2105E20 | 1005 | 40BFCA25
22345 | IBM | 2105E20 | 1005 | 40CFCA25
8520 | EMC | SYMMETRIX | 5265 | 370127202
4875 | EMC | SYMMETRIX | 5265 | 370281202
4875 | SEAGATE | ST1971FC | CC95 | LAM14520
4875 | UNISYS | 39 BYTES LO... | 901L | AC66203 | Assigned
10500 | UNISYS | 39 BYTES LO... | 1901 | ? | Assigned
22345 | IBM | 2105E20 | 1005 | 40BFCA24 | Assigned
22345 | IBM | 2105E20 | 1005 | 40CFCA24 | Unassign P...
8520 | EMC | SYMMETRIX | 5265 | 370127206 | Assigned
Total: 19 Displayed: 19 Selected: 0
Assign LUN
Unassign LUN
Reassign LUN
Welcome to the Tivoli Console
View Storage Devices
Manage Disks
archi
troodon
trex
raptor
108
112a
112b
112c
112d
110
114

FIG. 18

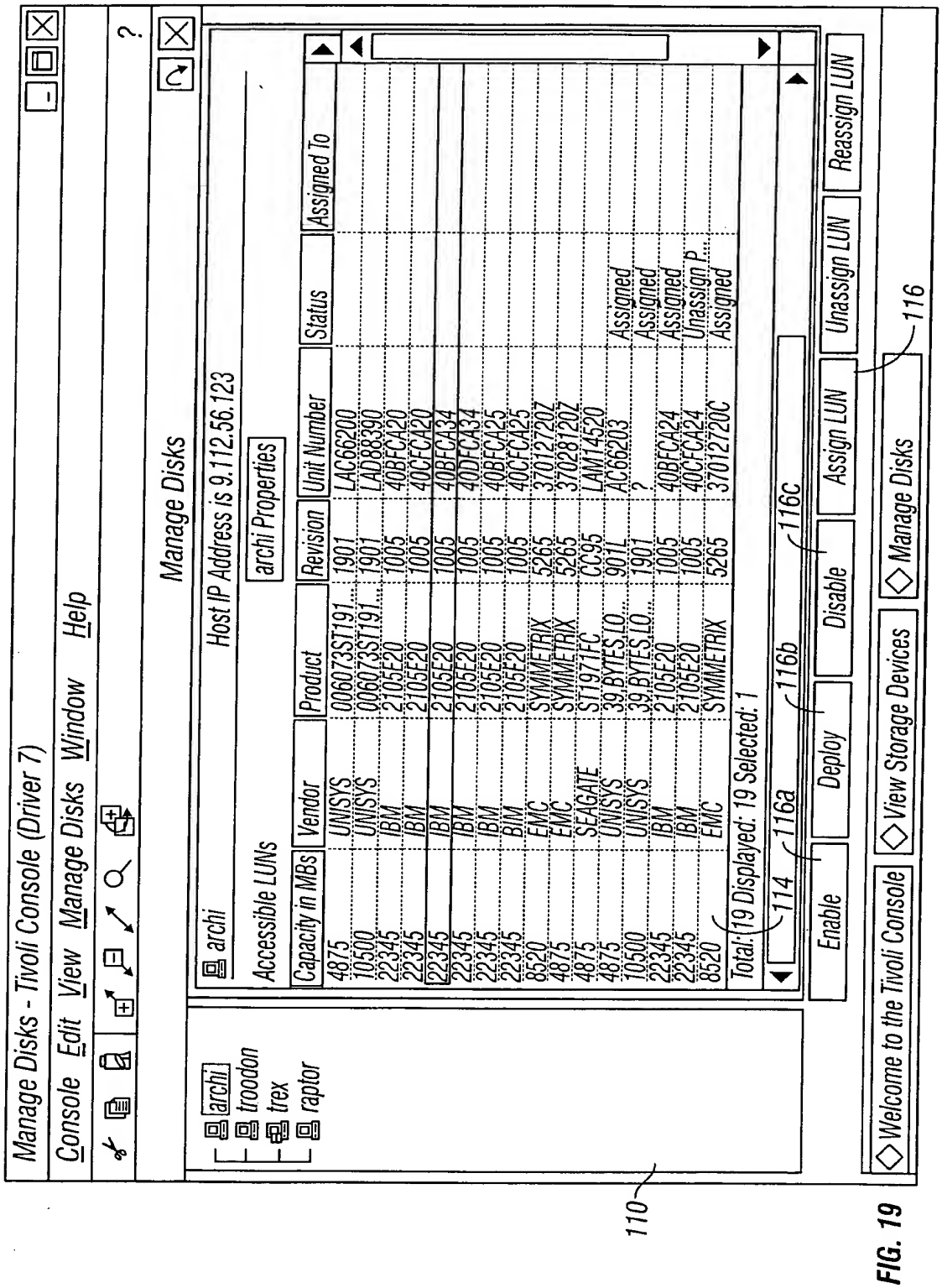
Manage Disks - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
Manage Disks
archi
troodon
trex
raptor
archi
Host IP Address is 9.112.56.123
archi Properties
Accessible LUNs
Capacity in MBs | Vendor | Product | Revision | Unit Number | Status | Assigned To
4875 | UNISYS | 006073ST191... | 1901 | LAC66200
10500 | UNISYS | 006073ST191... | 1901 | LAD88390
22345 | IBM | 2105E20 | 1005 | 40BFCA20
22345 | IBM | 2105E20 | 1005 | 40CFCA20
22345 | IBM | 2105E20 | 1005 | 40BFCA34
22345 | IBM | 2105E20 | 1005 | 40DFCA34
22345 | IBM | 2105E20 | 1005 | 40BFCA25
22345 | IBM | 2105E20 | 1005 | 40CFCA25
8520 | EMC | SYMMETRIX | 5265 | 370127207
4875 | EMC | SYMMETRIX | 5265 | 370281207
4875 | SEAGATE | ST1971FC | CC95 | LAM14520
4875 | UNISYS | 39 BYTES LO... | 901L | AC66203 | Assigned
10500 | UNISYS | 39 BYTES LO... | 1901 | ? | Assigned
22345 | IBM | 2105E20 | 1005 | 40BFCA24 | Assigned
22345 | IBM | 2105E20 | 1005 | 40CFCA24 | Unassign P...
8520 | EMC | SYMMETRIX | 5265 | 370127206 | Assigned
Total: 19 Displayed: 1 Selected: 1
114
116a
116b
116c
Enable
Deploy
Disable
Assign LUN
Unassign LUN
Reassign LUN
Welcome to the Tivoli Console
View Storage Devices
Manage Disks
116
110

FIG. 19

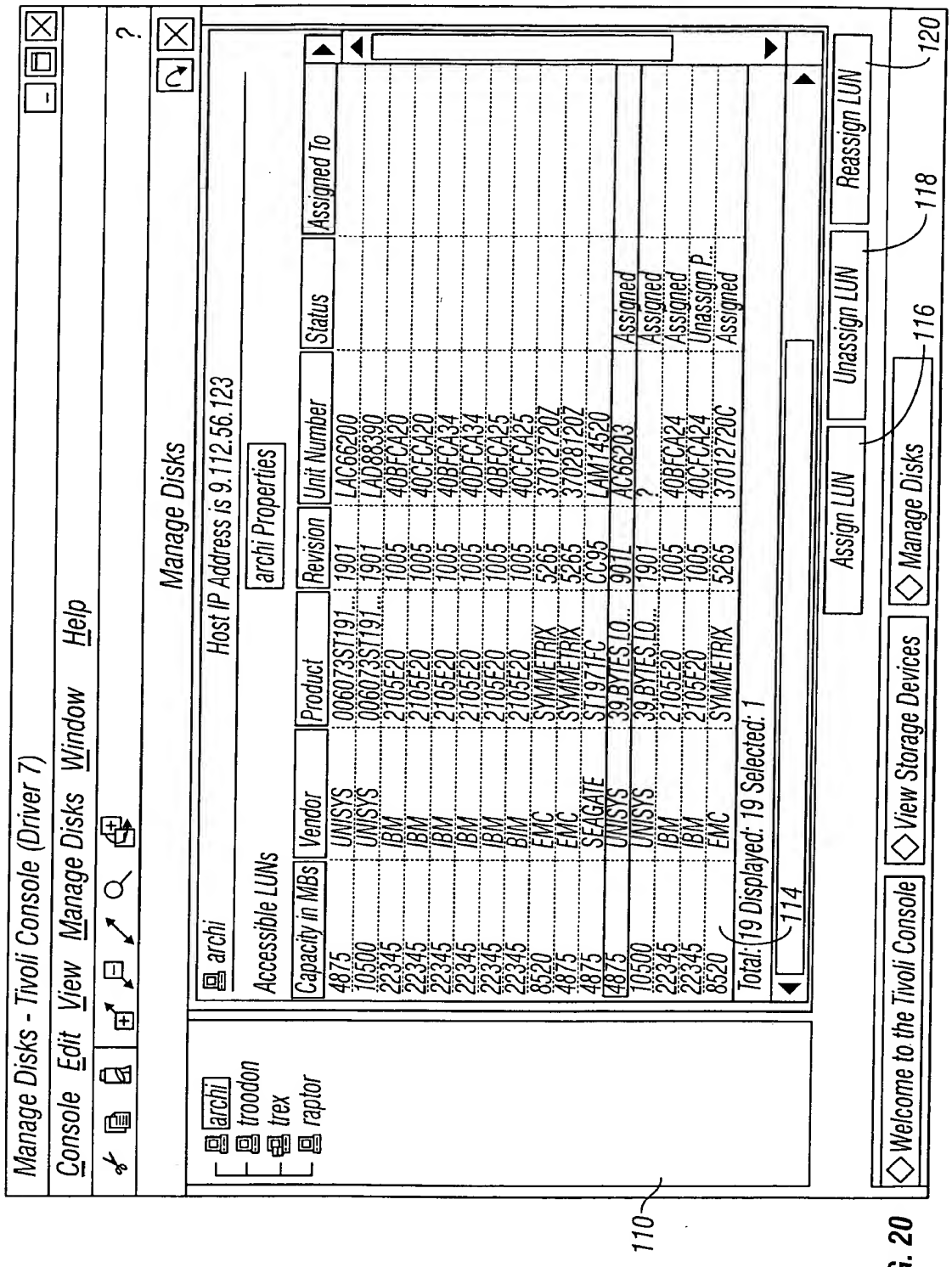
Manage Disks - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
Manage Disks
archi
troodon
trex
raptor
archi
Host IP Address is 9.112.56.123
archi Properties
Accessible LUNs
Capacity in MBs | Vendor | Product | Revision | Unit Number | Status | Assigned To
4875 UNISYS 006073ST191... 1901 LAC66200
10500 UNISYS 006073ST191... 1901 LAD88390
22345 IBM 2105E20 1005 40BFCA20
22345 IBM 2105E20 1005 40CFCA20
22345 IBM 2105E20 1005 40BFCA34
22345 IBM 2105E20 1005 40DFCA34
22345 IBM 2105E20 1005 40BFCA25
22345 IBM 2105E20 1005 40CFCA25
8520 EMC SYMMETRIX 5265 370127207
4875 EMC SYMMETRIX 5265 370281207
4875 SEAGATE ST1971FC CC95 LAM14520
4875 UNISYS 39 BYTES LO... 901L AC66203 Assigned
10500 UNISYS 39 BYTES LO... 1901 ? Assigned
22345 IBM 2105E20 1005 40BFCA24 Assigned
22345 IBM 2105E20 1005 40CFCA24 Unassign P...
8520 EMC SYMMETRIX 5265 370127206 Assigned
Total: 19 Displayed: 19 Selected: 1
114
Assign LUN
Unassign LUN
Reassign LUN
118
116
120
Welcome to the Tivoli Console
View Storage Devices
Manage Disks
110

FIG. 20

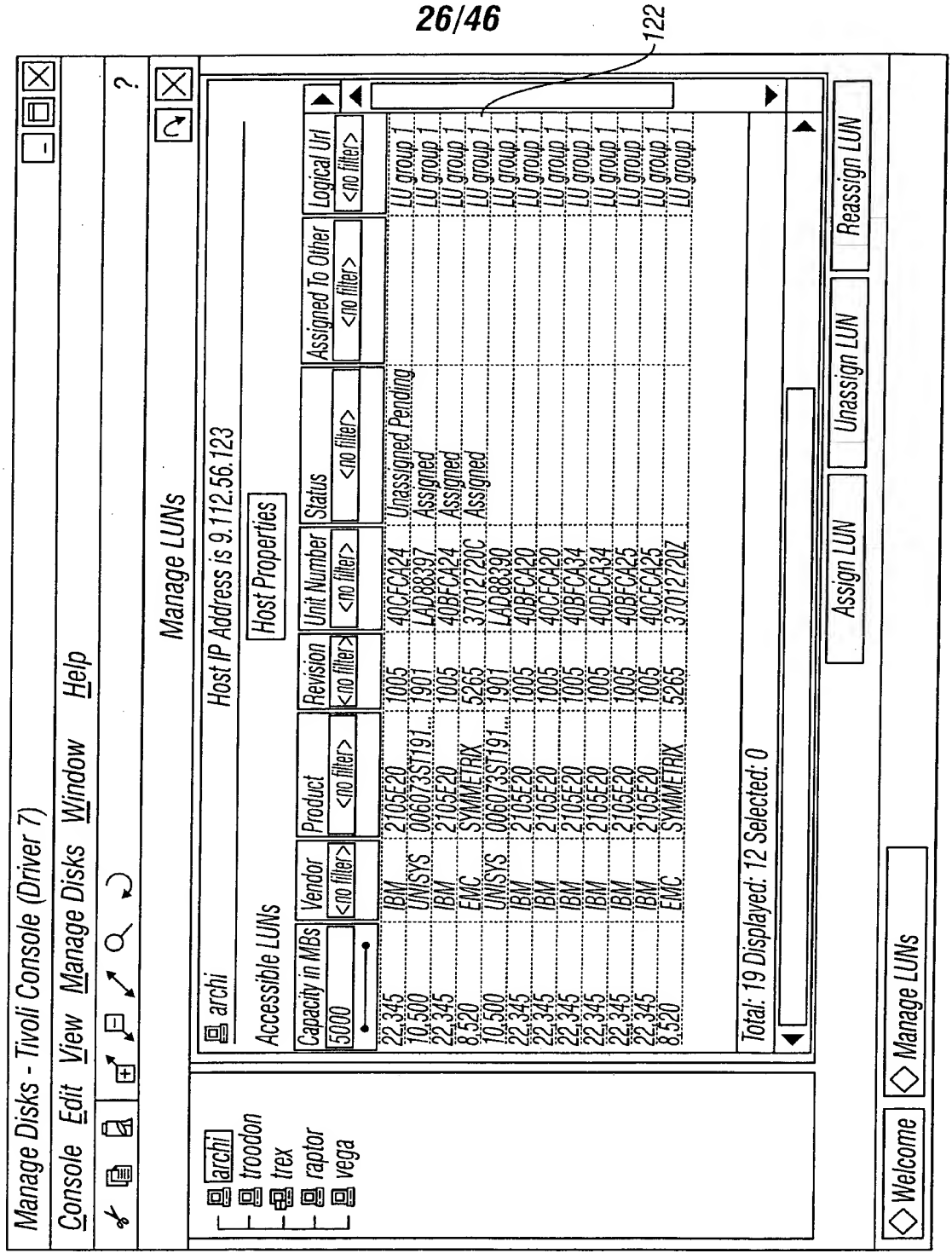
122
Manage Disks - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
Manage LUNs
archi
troodon
trex
raptor
vega
archi
Host IP Address is 9.112.56.123
Host Properties
Accessible LUNs
Capacity in MBs
5000
Vendor
Product
Revision
Unit Number
Status
Assigned To Other
Logical Url
<no filter>
22,345 IBM 2105E20 1005 40CFCA24 Unassigned Pending LU group 1
10,500 UNISYS 006073ST191... 1901 LAD88397 Assigned LU group 1
22,345 IBM 2105E20 1005 40BFCA24 Assigned LU group 1
8,520 EMC SYMMETRIX 5265 37012720C Assigned LU group 1
10,500 UNISYS 006073ST191... 1901 LAD88390 LU group 1
22,345 IBM 2105E20 1005 40BFCA20 LU group 1
22,345 IBM 2105E20 1005 40CFCA20 LU group 1
22,345 IBM 2105E20 1005 40BFCA34 LU group 1
22,345 IBM 2105E20 1005 40DFCA34 LU group 1
22,345 IBM 2105E20 1005 40BFCA25 LU group 1
22,345 IBM 2105E20 1005 40CFCA25 LU group 1
8,520 EMC SYMMETRIX 5265 37012720Z LU group 1
Total: 19 Displayed: 12 Selected: 0
Assign LUN
Unassign LUN
Reassign LUN
Welcome
Manage LUNs

FIG. 21

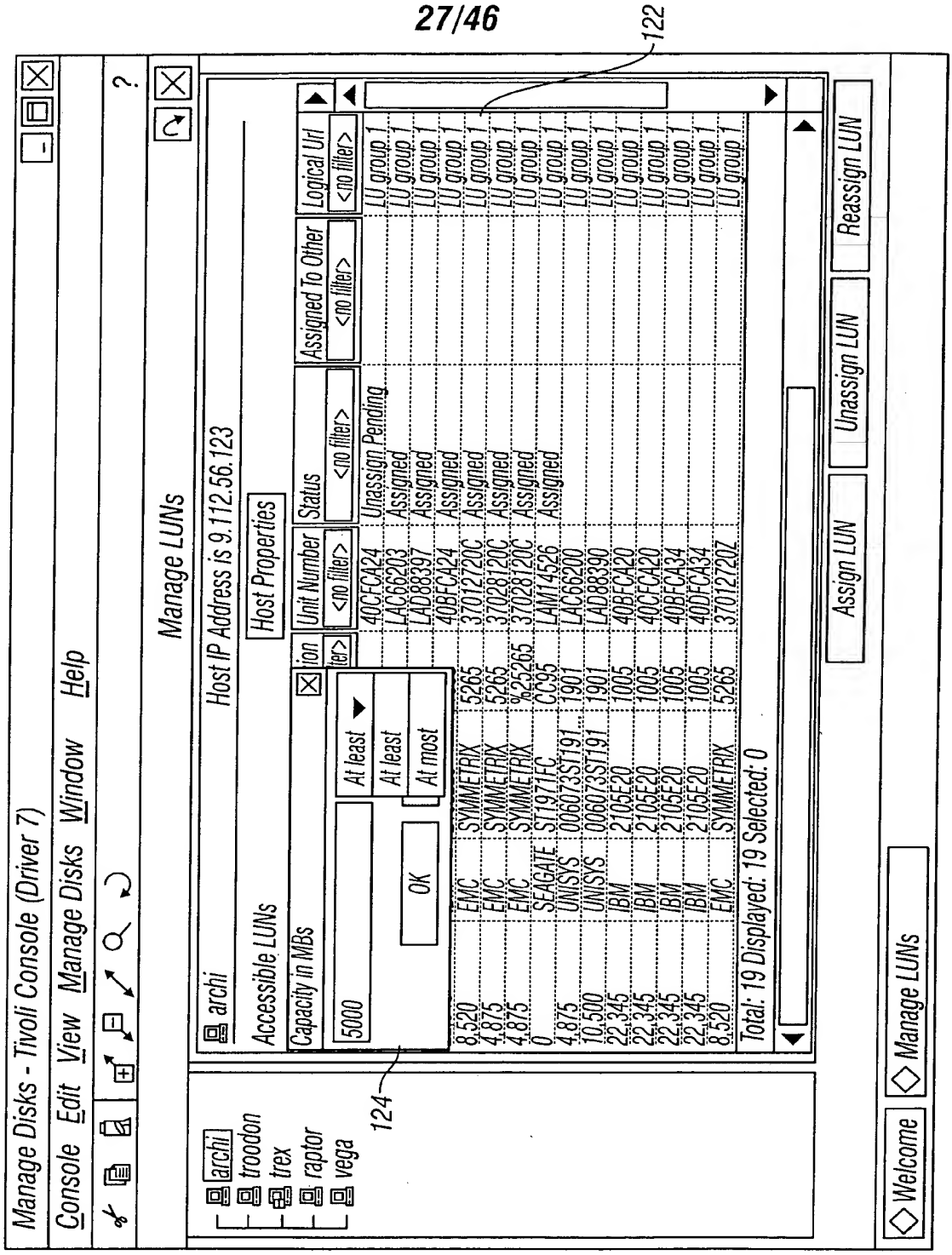
Manage Disks - Tivoli Console (Driver 7)
Console Edit View Manage Disks Window Help
Manage LUNs
archi
troodon
trex
raptor
vega
Host IP Address is 9.112.56.123
Host Properties
Accessible LUNs
Capacity in MBs
Unit Number
Status
Assigned To Other
Logical Url
5000
At least
At least
At most
OK
Assign LUN
Unassign LUN
Reassign LUN
Total: 19 Displayed: 19 Selected: 0
Welcome
Manage LUNs
122
124

FIG. 22

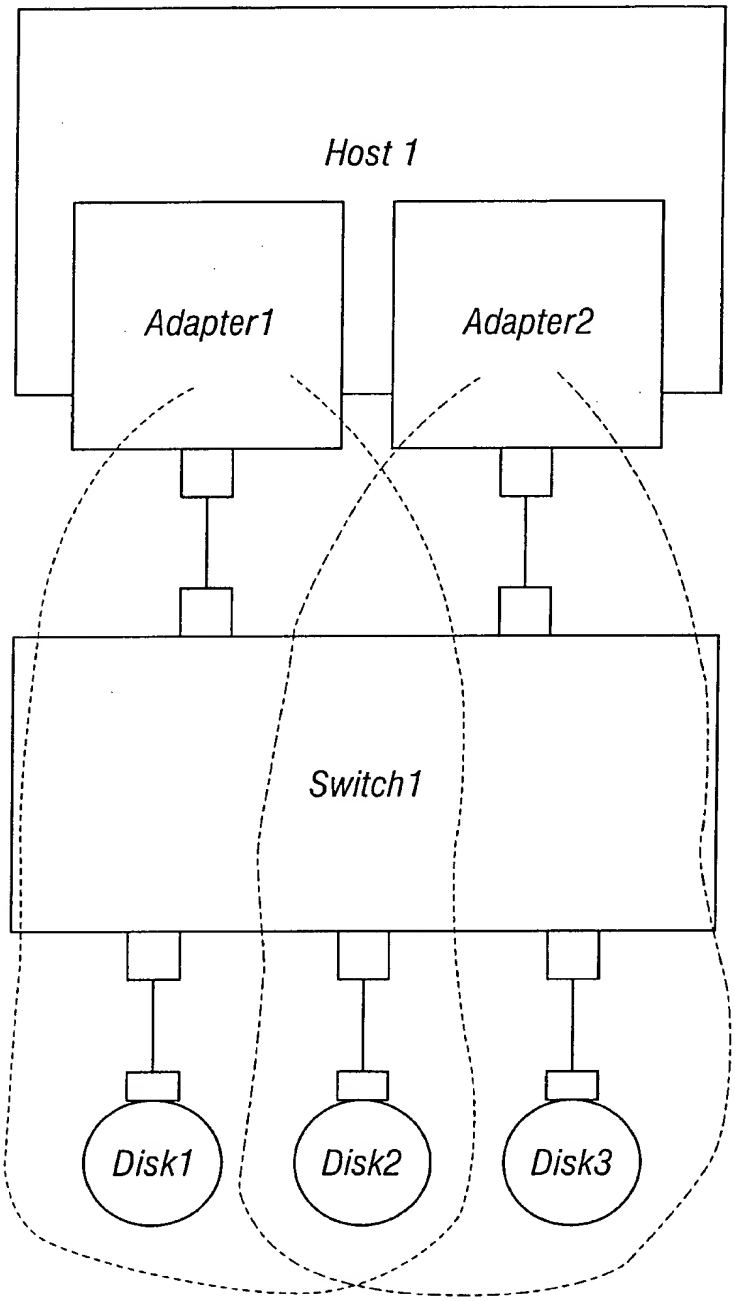

FIG. 23

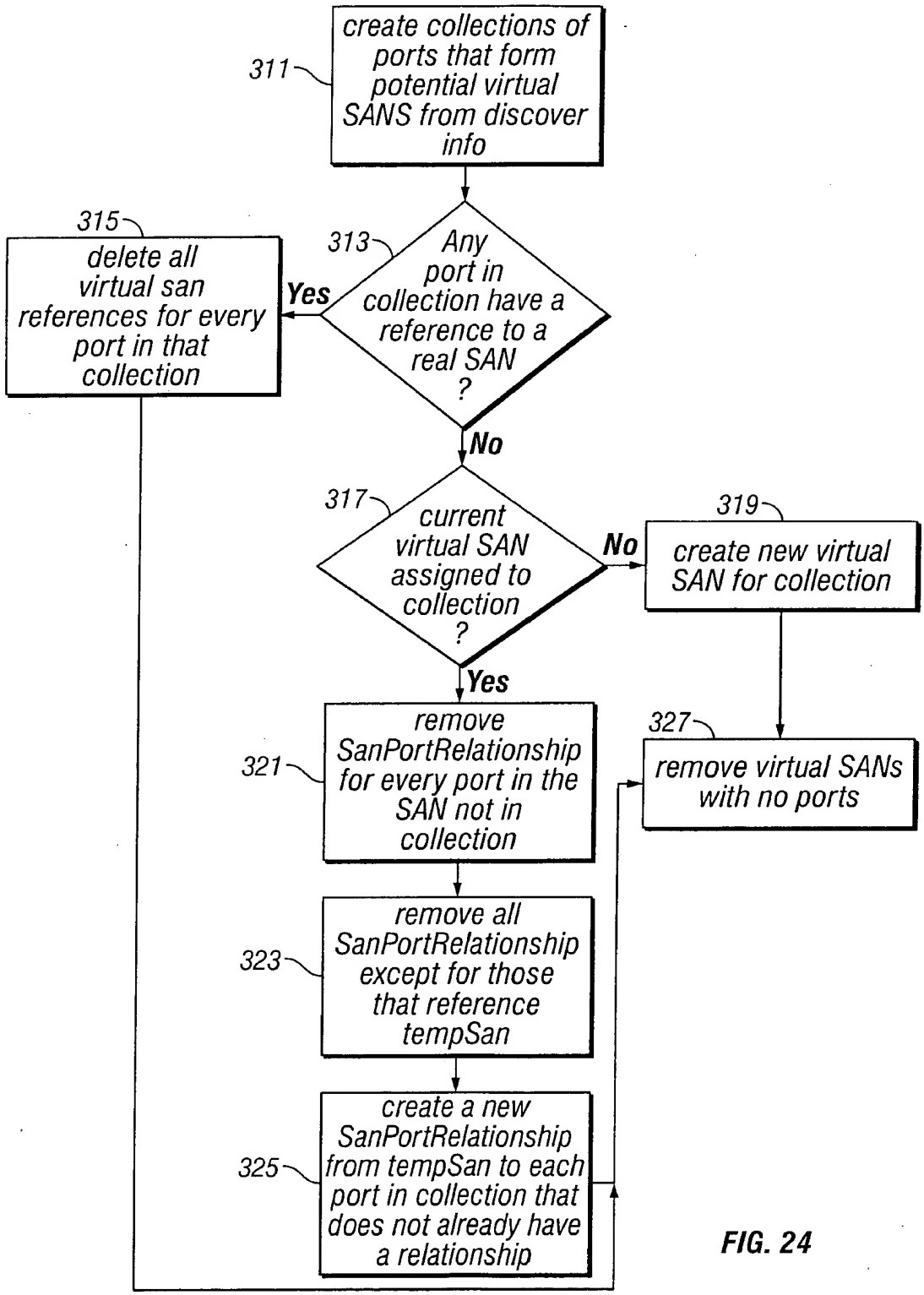
311
create collections of ports that form potential virtual SANS from discover info
313
Any port in collection have a reference to a real SAN ?
Yes
315
delete all virtual san references for every port in that collection
No
317
current virtual SAN assigned to collection ?
No
319
create new virtual SAN for collection
Yes
321
remove SanPortRelationship for every port in the SAN not in collection
323
remove all SanPortRelationship except for those that reference tempSan
325
create a new SanPortRelationship from tempSan to each port in collection that does not already have a relationship
327
remove virtual SANs with no ports

FIG. 24

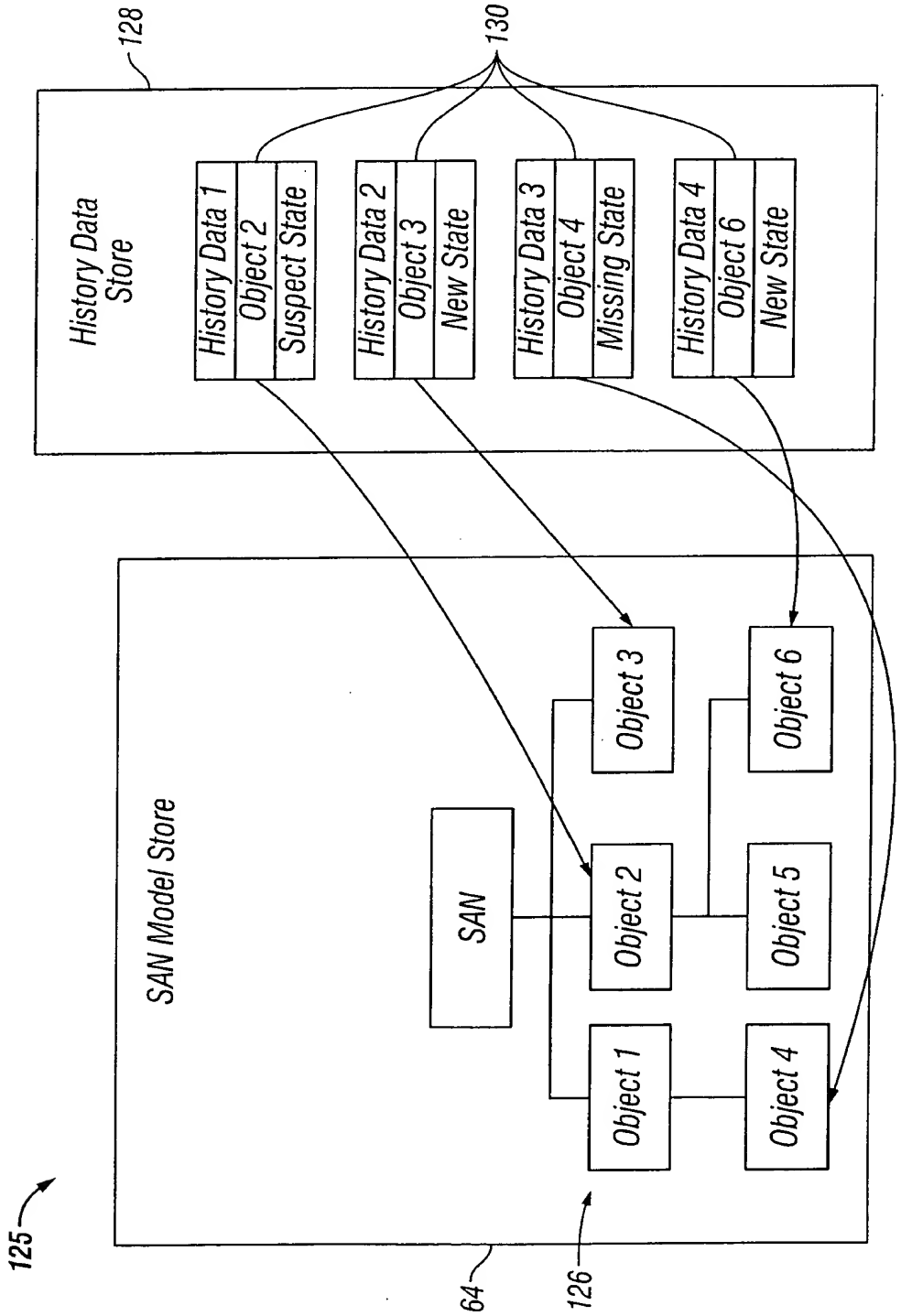
128
130
History Data Store
History Data 1
Object 2
Suspect State
History Data 2
Object 3
New State
History Data 3
Object 4
Missing State
History Data 4
Object 6
New State
SAN Model Store
SAN
Object 3
Object 6
Object 2
Object 5
Object 1
Object 4
125
64
126

FIG. 25

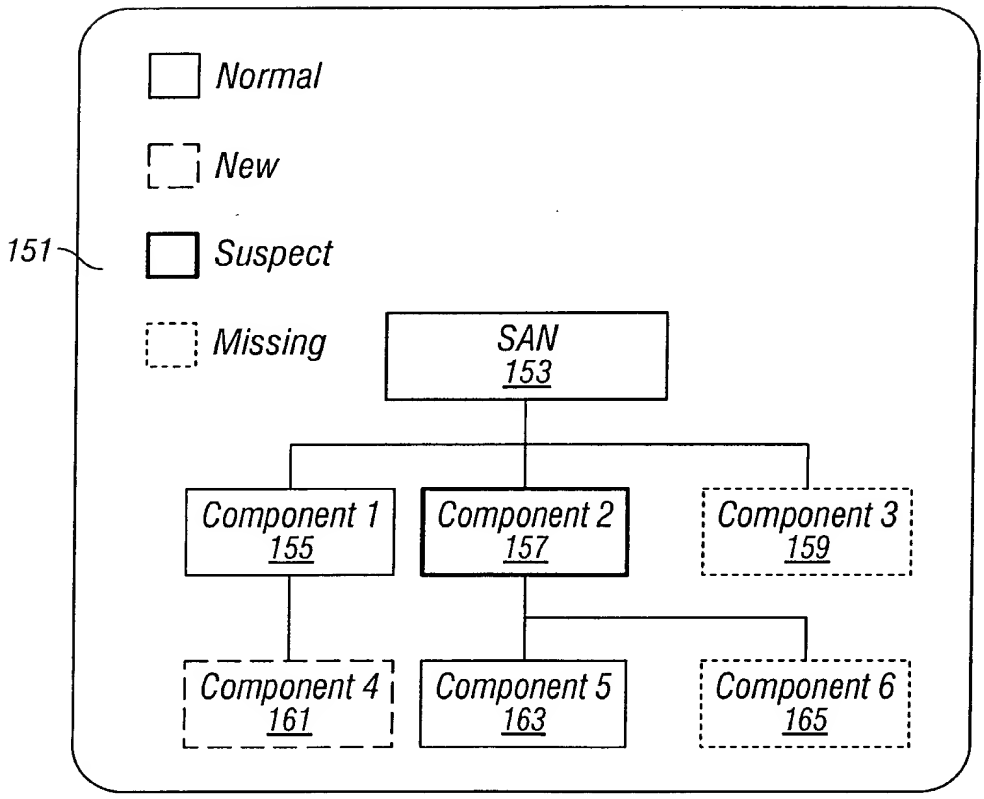
Normal
New
151
Suspect
Missing
SAN
153
Component 1
155
Component 2
157
Component 3
159
Component 4
161
Component 5
163
Component 6
165

FIG. 26

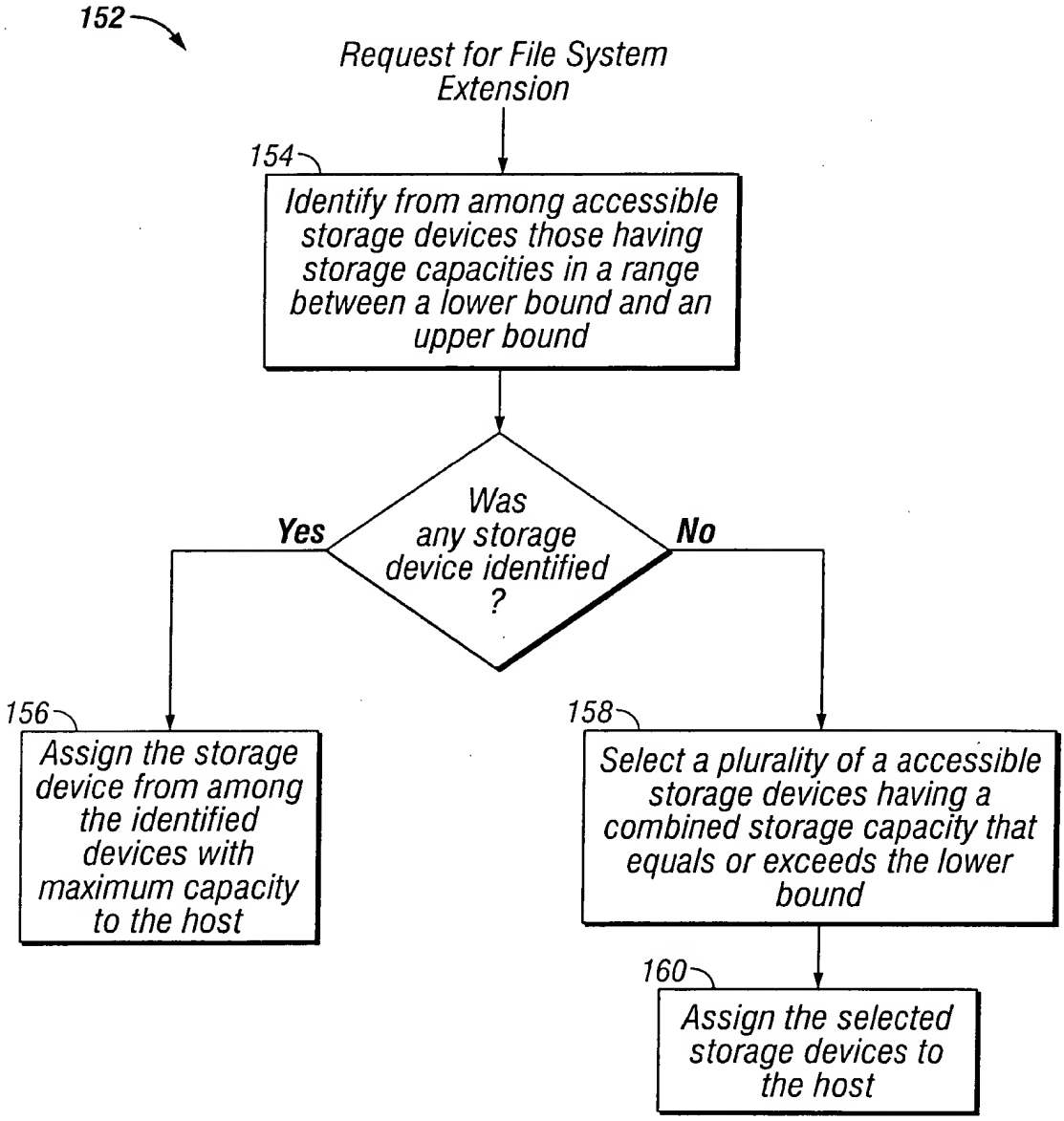
152
Request for File System Extension
154
Identify from among accessible storage devices those having storage capacities in a range between a lower bound and an upper bound
Was any storage device identified ?
Yes
No
156
Assign the storage device from among the identified devices with maximum capacity to the host
158
Select a plurality of a accessible storage devices having a combined storage capacity that equals or exceeds the lower bound
160
Assign the selected storage devices to the host

FIG. 27

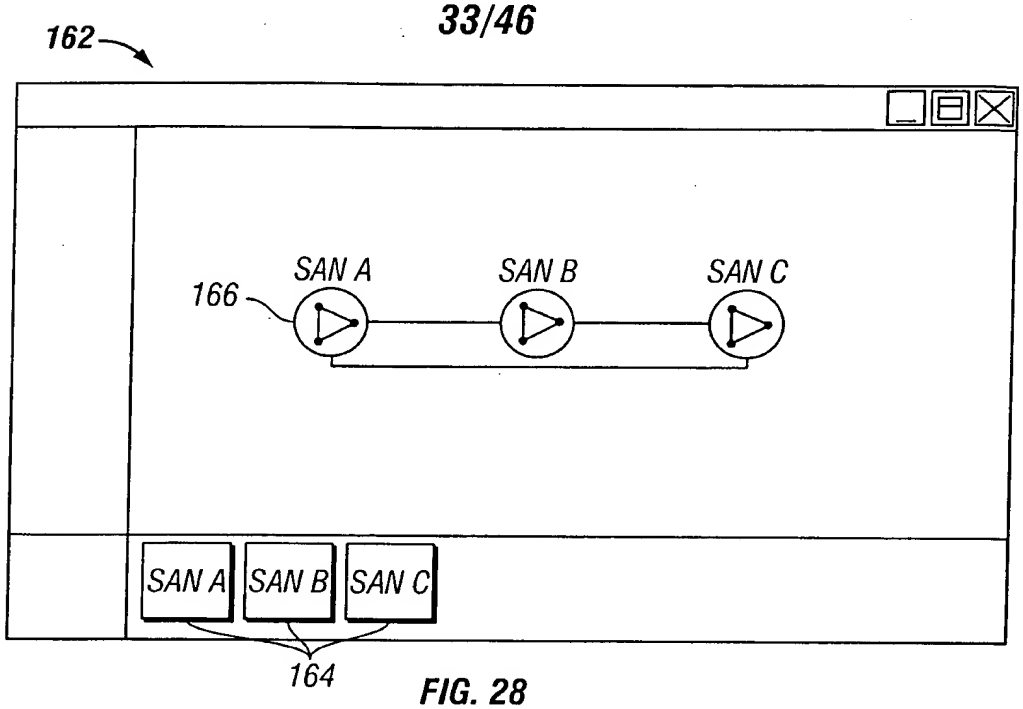
162
SAN A
SAN B
SAN C
166
SAN A
SAN B
SAN C
164

FIG. 28

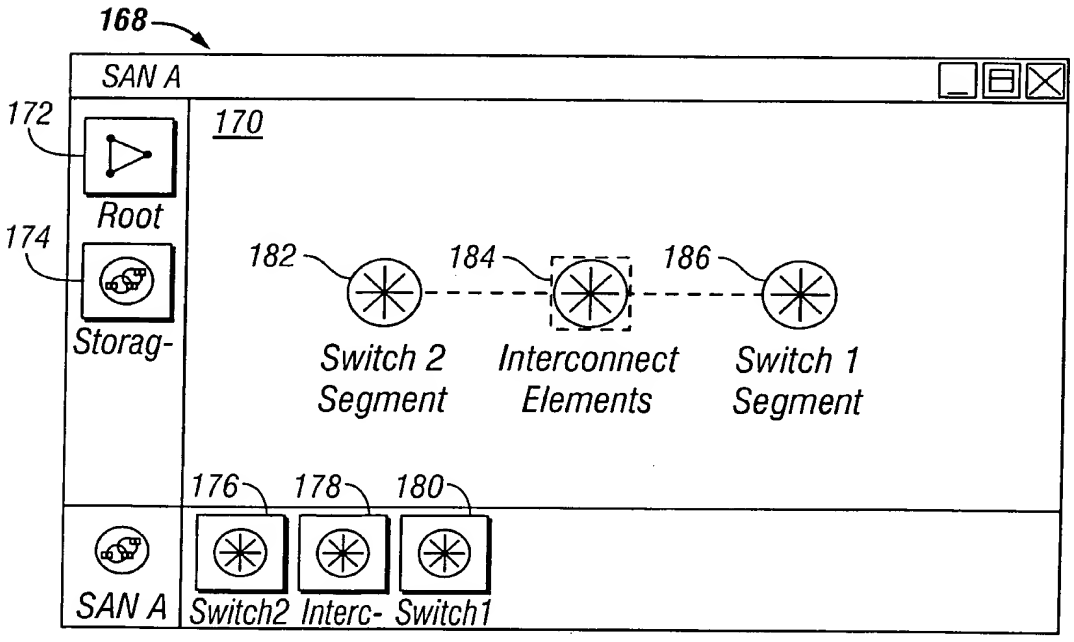
168
SAN A
172
170
Root
174
Storag-
182
184
186
Switch 2 Segment
Interconnect Elements
Switch 1 Segment
176
178
180
SAN A
Switch2
Interc-
Switch1

FIG. 29

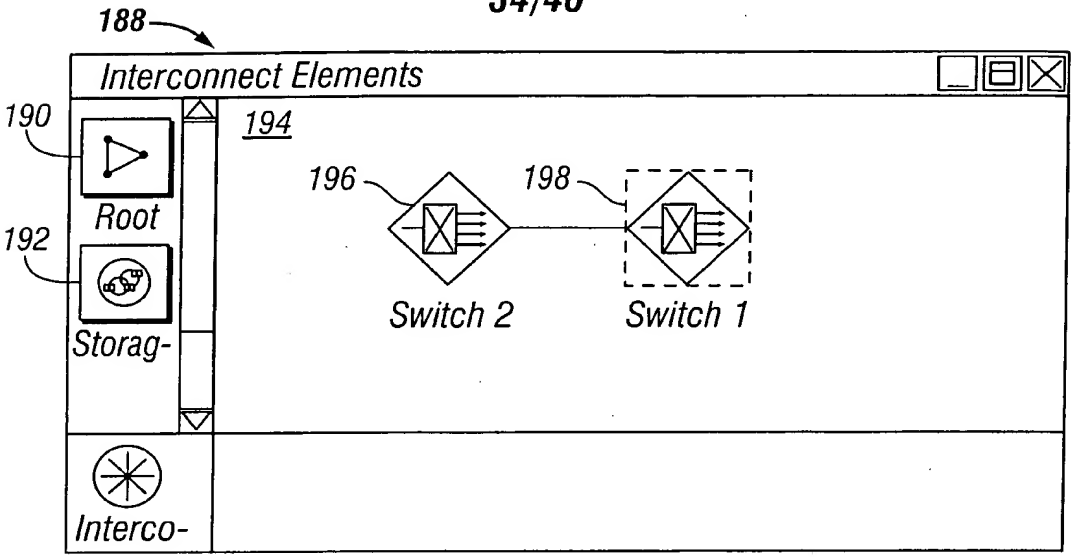
188
Interconnect Elements
190
Root
192
Storag-
194
196
198
Switch 2
Switch 1
Interco-

FIG. 30

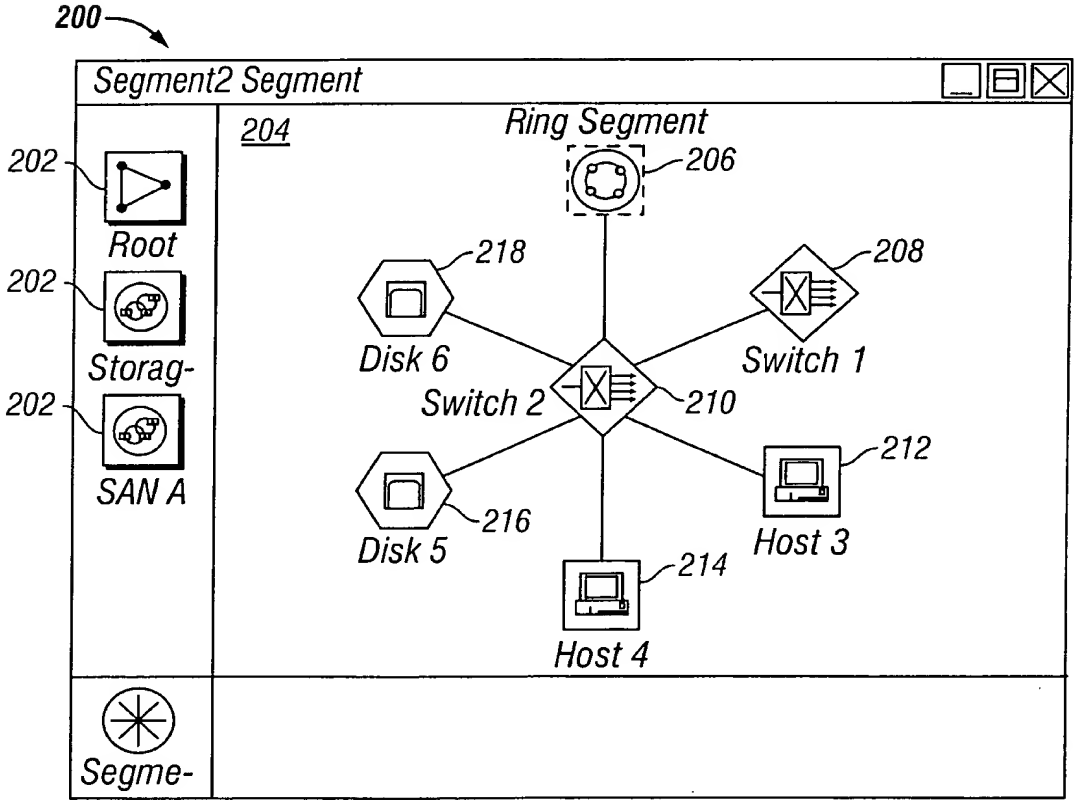
200
Segment2 Segment
202
Root
202
Storag-
202
SAN A
204
Ring Segment
206
218
208
Disk 6
Switch 1
Switch 2
210
212
216
Disk 5
Host 3
214
Host 4
Segme-

FIG. 31

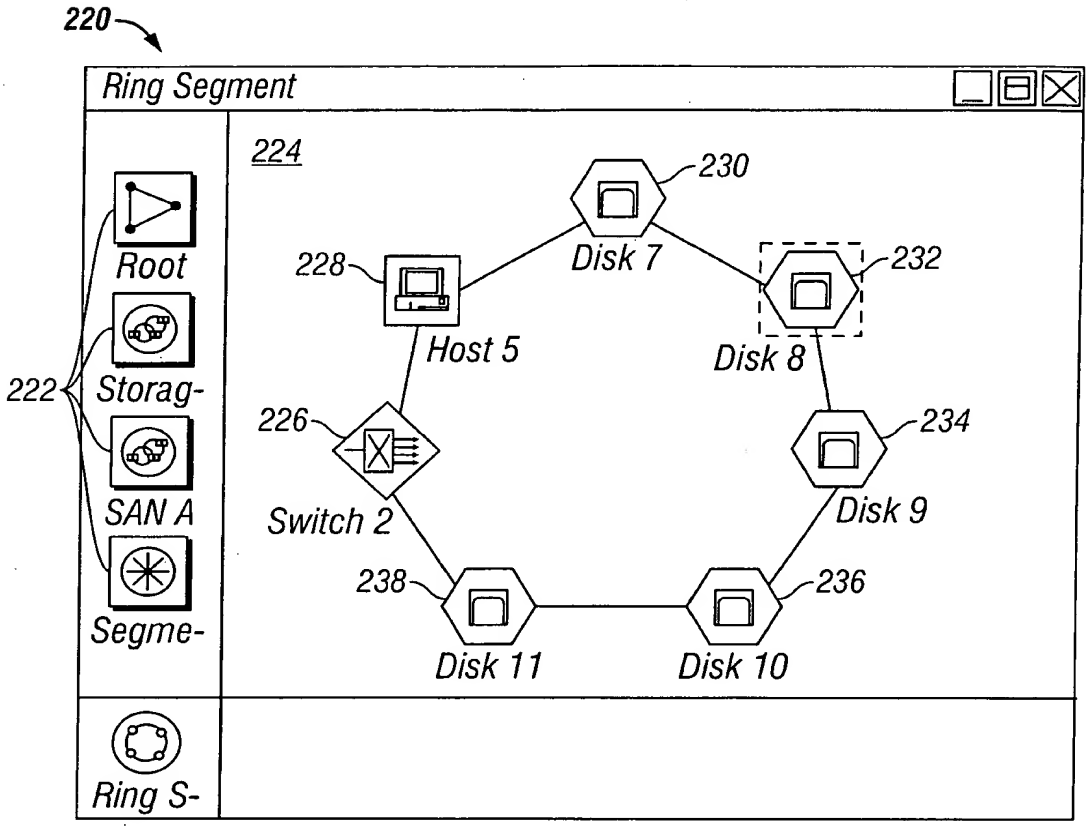
220
Ring Segment
224
230
Disk 7
228
232
Host 5
Disk 8
222
Root
Storag-
226
234
SAN A
Switch 2
Disk 9
238
236
Segme-
Disk 11
Disk 10
Ring S-

FIG. 32

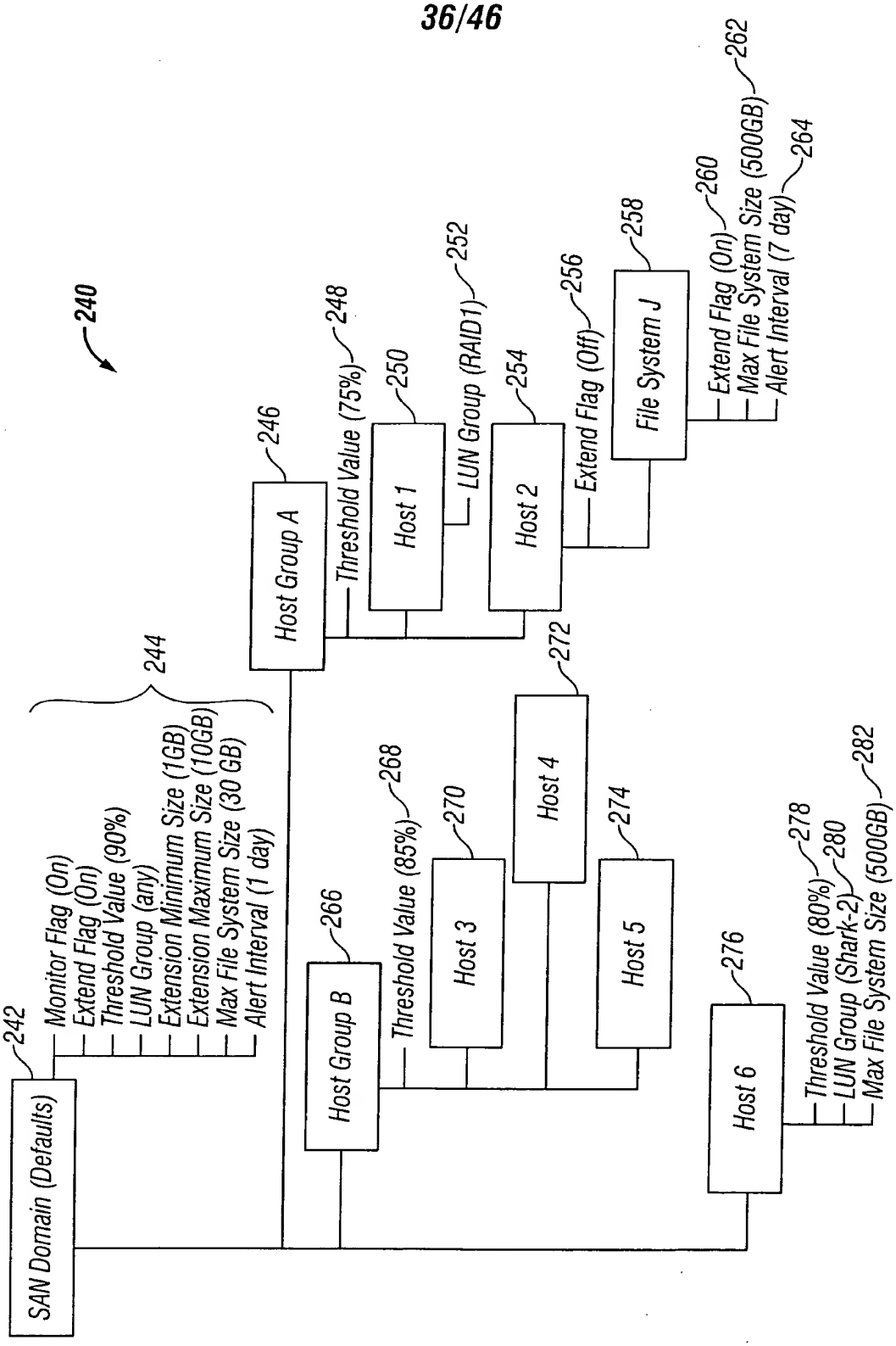
240
SAN Domain (Defaults)
242
Monitor Flag (On)
Extend Flag (On)
Threshold Value (90%)
LUN Group (any)
Extension Minimum Size (1GB)
Extension Maximum Size (10GB)
Max File System Size (30 GB)
Alert Interval (1 day)
244
Host Group A
246
Threshold Value (75%)
248
Host 1
250
LUN Group (RAID1)
252
Host 2
254
Extend Flag (Off)
256
File System J
258
Extend Flag (On)
260
Max File System Size (500GB)
262
Alert Interval (7 day)
264
Host Group B
266
Threshold Value (85%)
268
Host 3
270
Host 4
272
Host 5
274
Host 6
276
Threshold Value (80%)
278
LUN Group (Shark-2)
280
Max File System Size (500GB)
282

FIG. 33

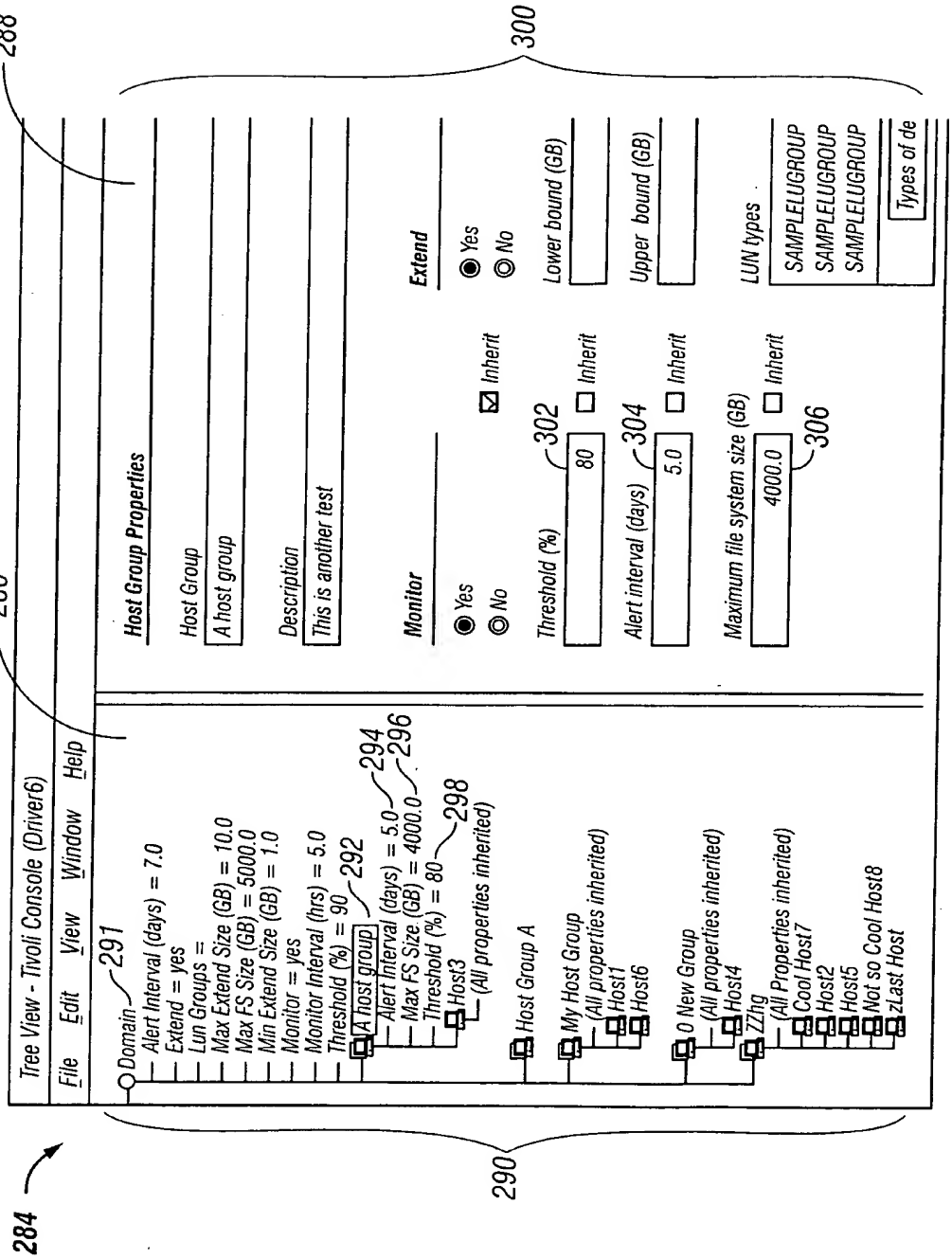
284
286
288
290
291
292
294
296
298
300
302
304
306
Tree View - Tivoli Console (Driver6)
File Edit View Window Help
Domain
Alert Interval (days) = 7.0
Extend = yes
Lun Groups =
Max Extend Size (GB) = 10.0
Max FS Size (GB) = 5000.0
Min Extend Size (GB) = 1.0
Monitor = yes
Monitor Interval (hrs) = 5.0
Threshold (%) = 90
A host group
Alert Interval (days) = 5.0
Max FS Size (GB) = 4000.0
Threshold (%) = 80
Host3
(All properties inherited)
Host Group A
My Host Group
(All properties inherited)
Host1
Host6
0 New Group
(All properties inherited)
Host4
ZZhg
(All Properties inherited)
Cool Host7
Host2
Host5
Not so Cool Host8
zLast Host
Host Group Properties
Host Group
A host group
Description
This is another test
Monitor
Yes
No
Inherit
Threshold (%)
80
Inherit
Alert interval (days)
5.0
Inherit
Maximum file system size (GB)
4000.0
Inherit
Extend
Yes
No
Inherit
Lower bound (GB)
Inherit
Upper bound (GB)
Inherit
LUN types
SAMPLELUGROUP
SAMPLELUGROUP
SAMPLELUGROUP
Types of de

FIG. 34

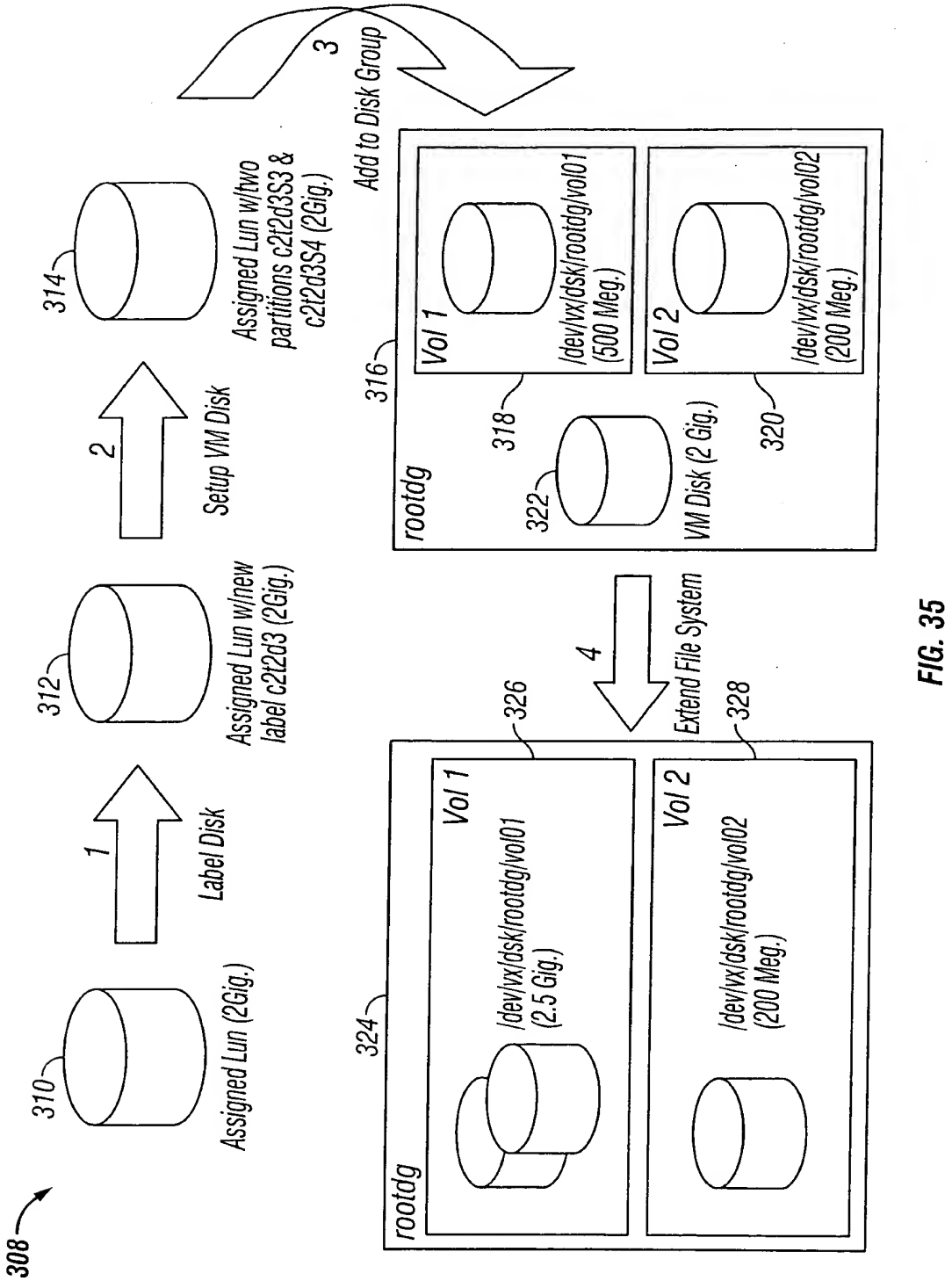
308
310
Assigned Lun (2Gig.)
1
Label Disk
312
Assigned Lun w/new label c2t2d3 (2Gig.)
2
Setup VM Disk
314
Assigned Lun w/two partitions c2t2d3S3 & c2t2d3S4 (2Gig.)
3
Add to Disk Group
4
Extend File System
316
rootdg
Vol 1
/dev/vx/dsk/rootdg/vol01 (500 Meg.)
318
Vol 2
/dev/vx/dsk/rootdg/vol02 (200 Meg.)
320
322
VM Disk (2 Gig.)
324
rootdg
Vol 1
/dev/vx/dsk/rootdg/vol01 (2.5 Gig.)
326
Vol 2
/dev/vx/dsk/rootdg/vol02 (200 Meg.)
328

FIG. 35

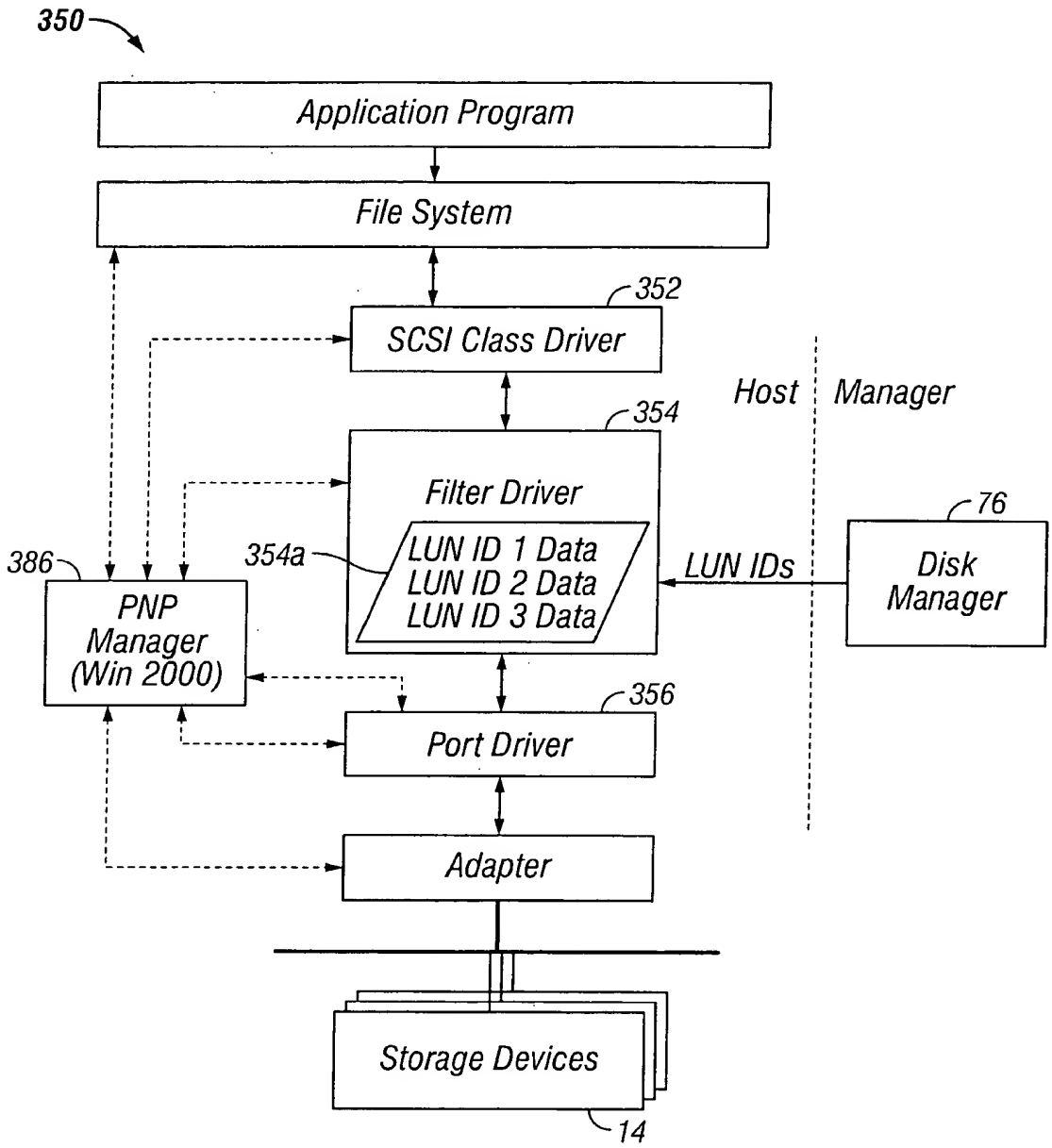
350
Application Program
File System
352
SCSI Class Driver
Host
Manager
354
Filter Driver
354a
LUN ID 1 Data
LUN ID 2 Data
LUN ID 3 Data
76
LUN IDs
Disk Manager
386
PNP Manager (Win 2000)
356
Port Driver
Adapter
Storage Devices
14

FIG. 36

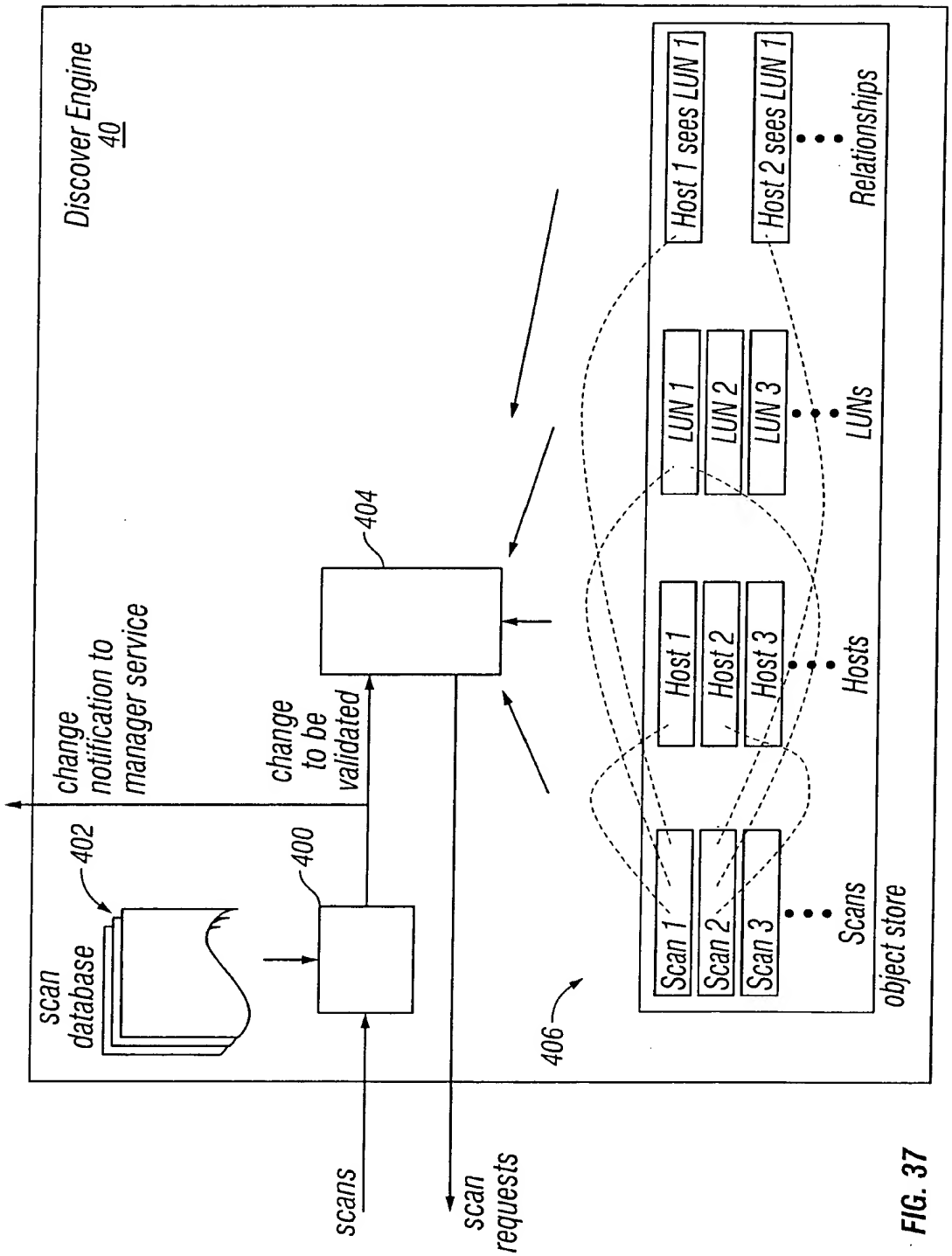
Discover Engine
40
change notification to manager service
change to be validated
404
402
400
scan database
406
scans
scan requests
Host 1 sees LUN 1
Host 2 sees LUN 1
Relationships
LUN 1
LUN 2
LUN 3
LUNs
Host 1
Host 2
Host 3
Hosts
Scan 1
Scan 2
Scan 3
Scans
object store

FIG. 37

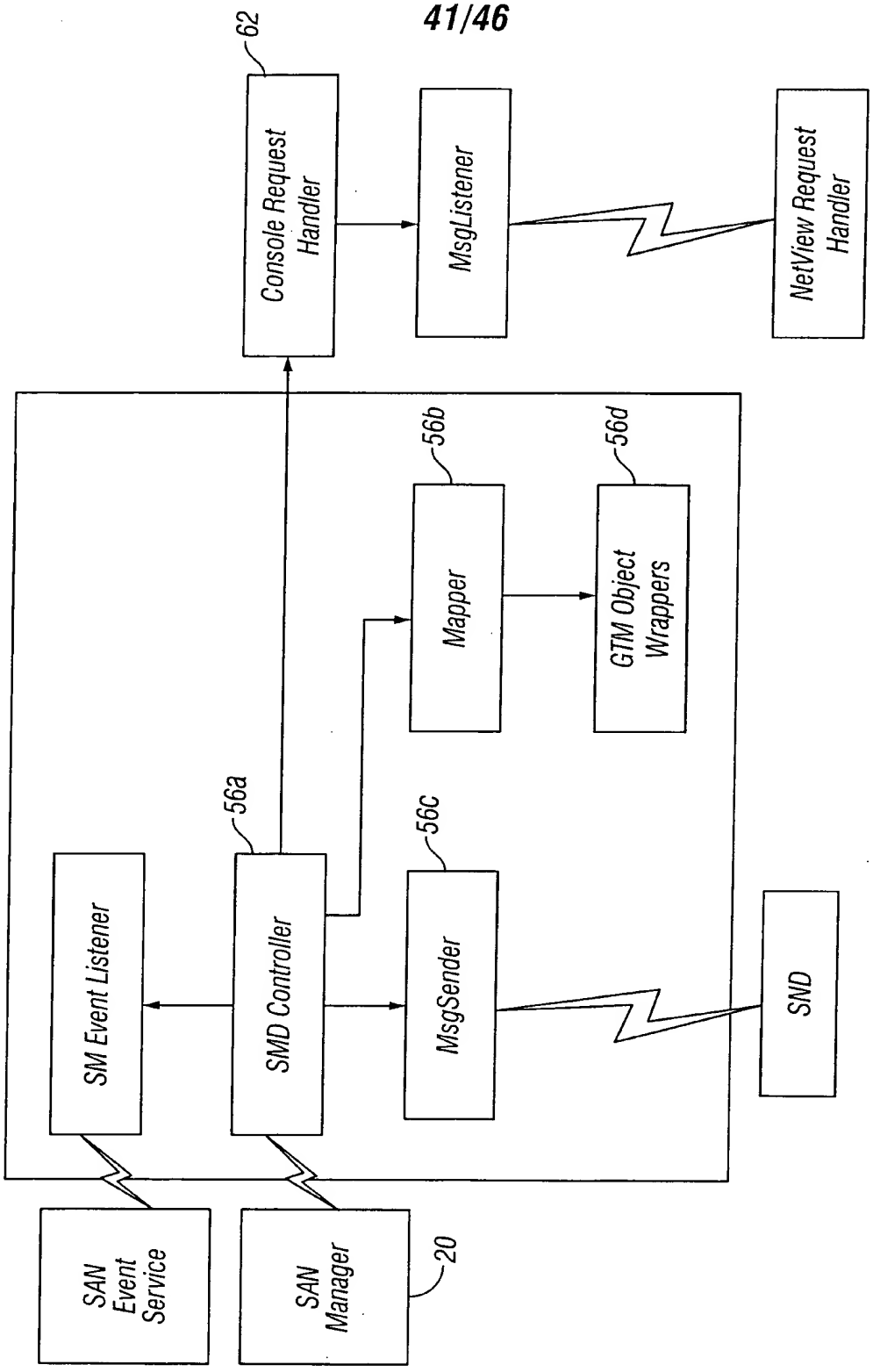
62
Console Request Handler
MsgListener
NetView Request Handler
56b
Mapper
56d
GTM Object Wrappers
56a
SMD Controller
56C
MsgSender
SND
SM Event Listener
SAN Event Service
SAN Manager
20

FIG. 38

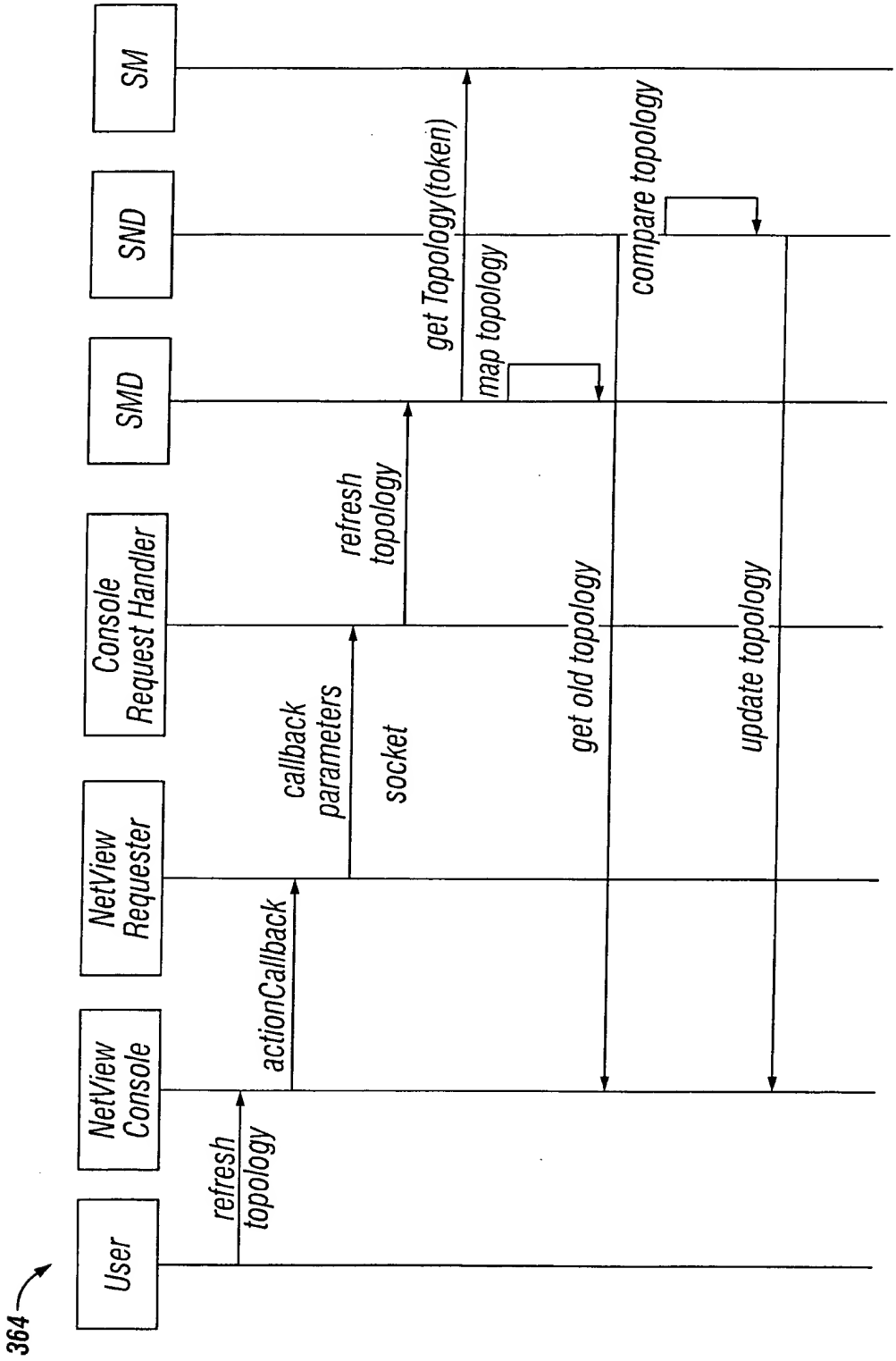
364
User
NetView Console
NetView Requester
Console Request Handler
SMD
SND
SM
refresh topology
actionCallback
callback parameters
socket
refresh topology
get Topology(token)
map topology
get old topology
compare topology
update topology

FIG. 39

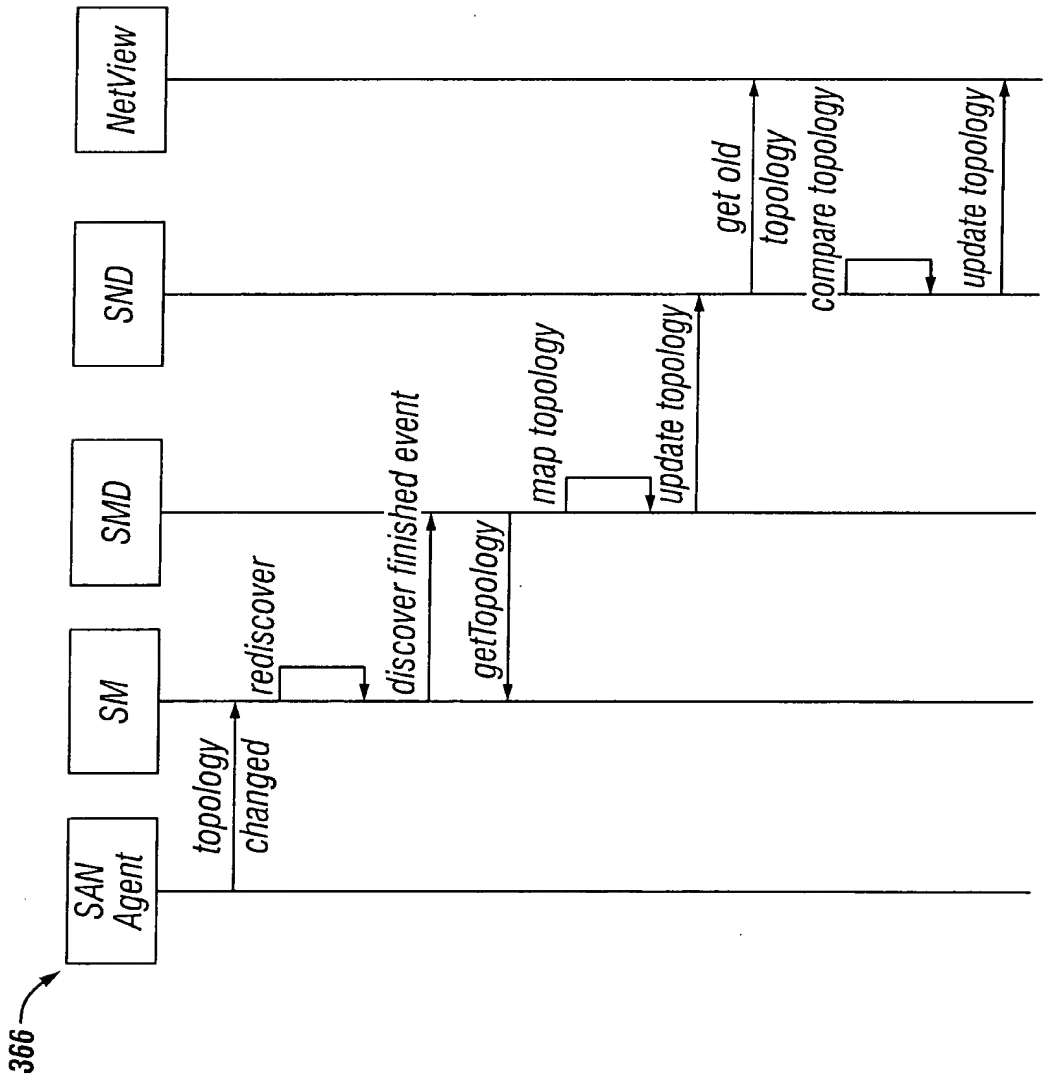
366
SAN Agent
SM
SMD
SND
NetView
topology changed
rediscover
discover finished event
getTopology
map topology
update topology
get old topology
compare topology
update topology

FIG. 40

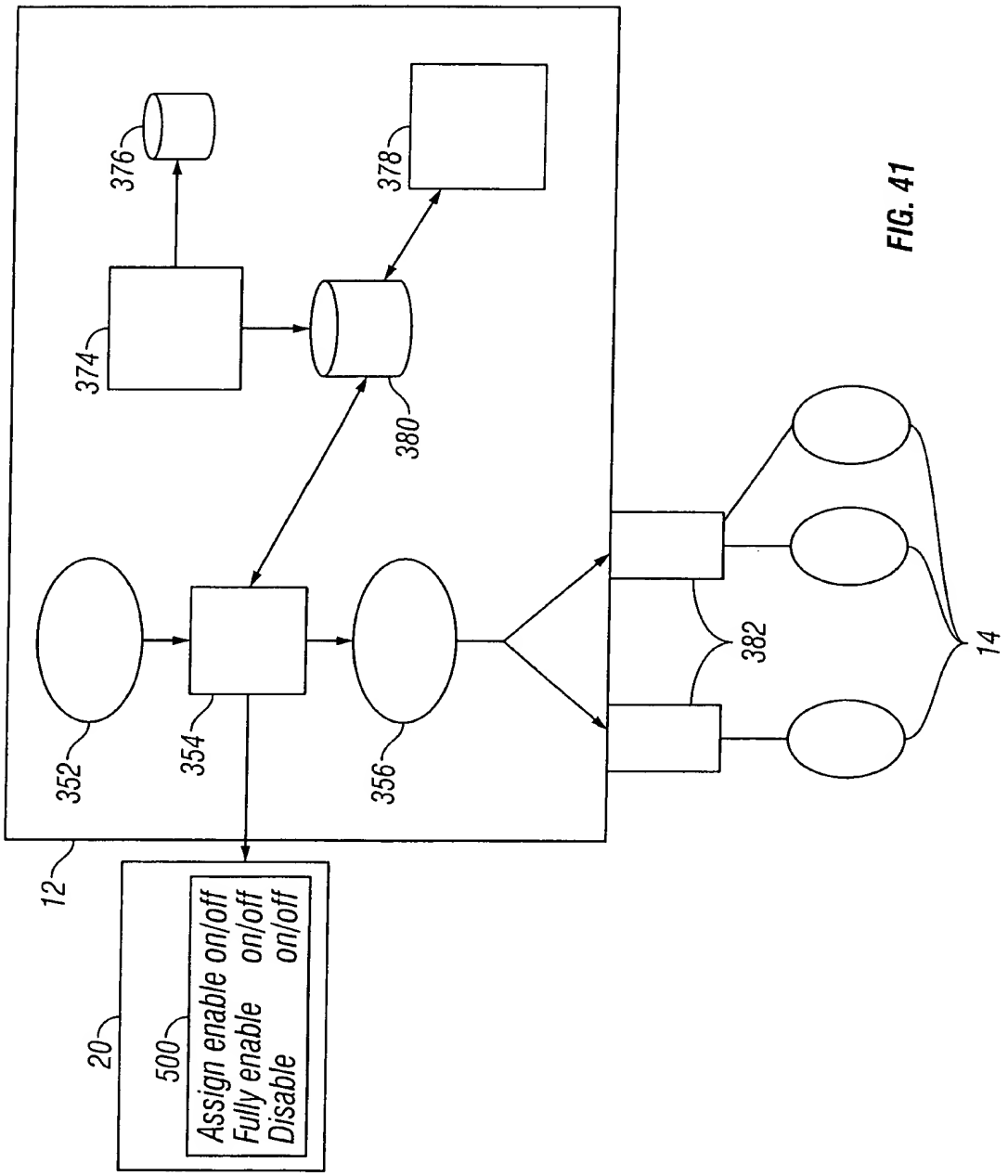
376
378
374
380
352
354
356
382
14
12
20
500
Assign enable on/off
Fully enable on/off
Disable on/off

FIG. 41

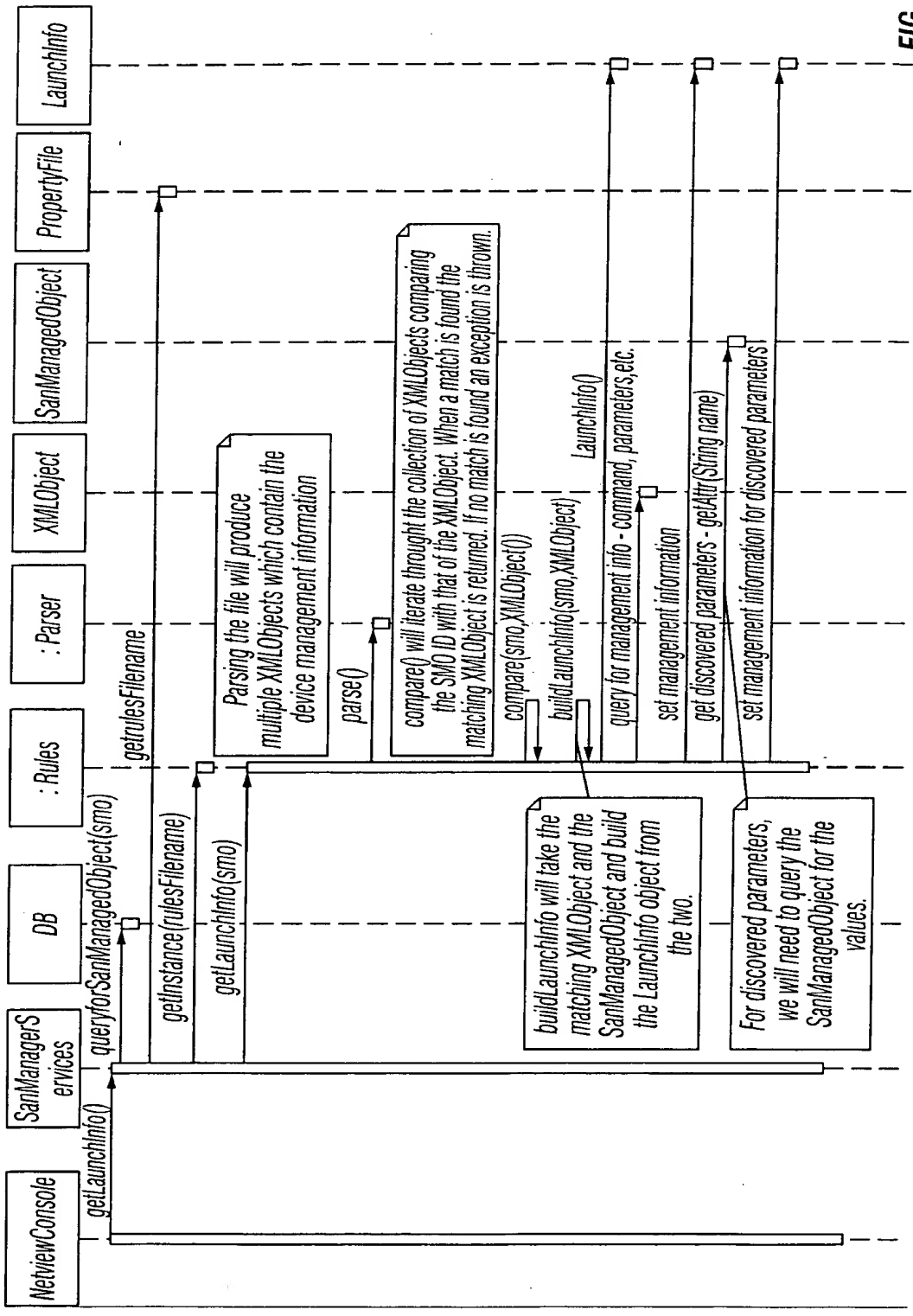
NetviewConsole
SanManagerServices
DB
: Rules
: Parser
XMLObject
SanManagedObject
PropertyFile
LaunchInfo
getLaunchInfo()
queryforSanManagedObject(smo)
getInstance(rulesFilename)
getLaunchInfo(smo)
getrulesFilename
Parsing the file will produce multiple XMLObjects which contain the device management information
parse()
compare() will iterate throught the collection of XMLObjects comparing the SMO ID with that of the XMLObject. When a match is found the matching XMLObject is returned. If no match is found an exception is thrown.
compare(smo,XMLObject())
buildLaunchInfo(smo,XMLObject)
LaunchInfo()
query for management info - command, parameters,etc.
set management information
get discovered parameters - getAttr(String name)
set management information for discovered parameters
buildLaunchInfo will take the matching XMLObject and the SanManagedObject and build the LaunchInfo object from the two.
For discovered parameters, we will need to query the SanManagedObject for the values.

FIG. 42

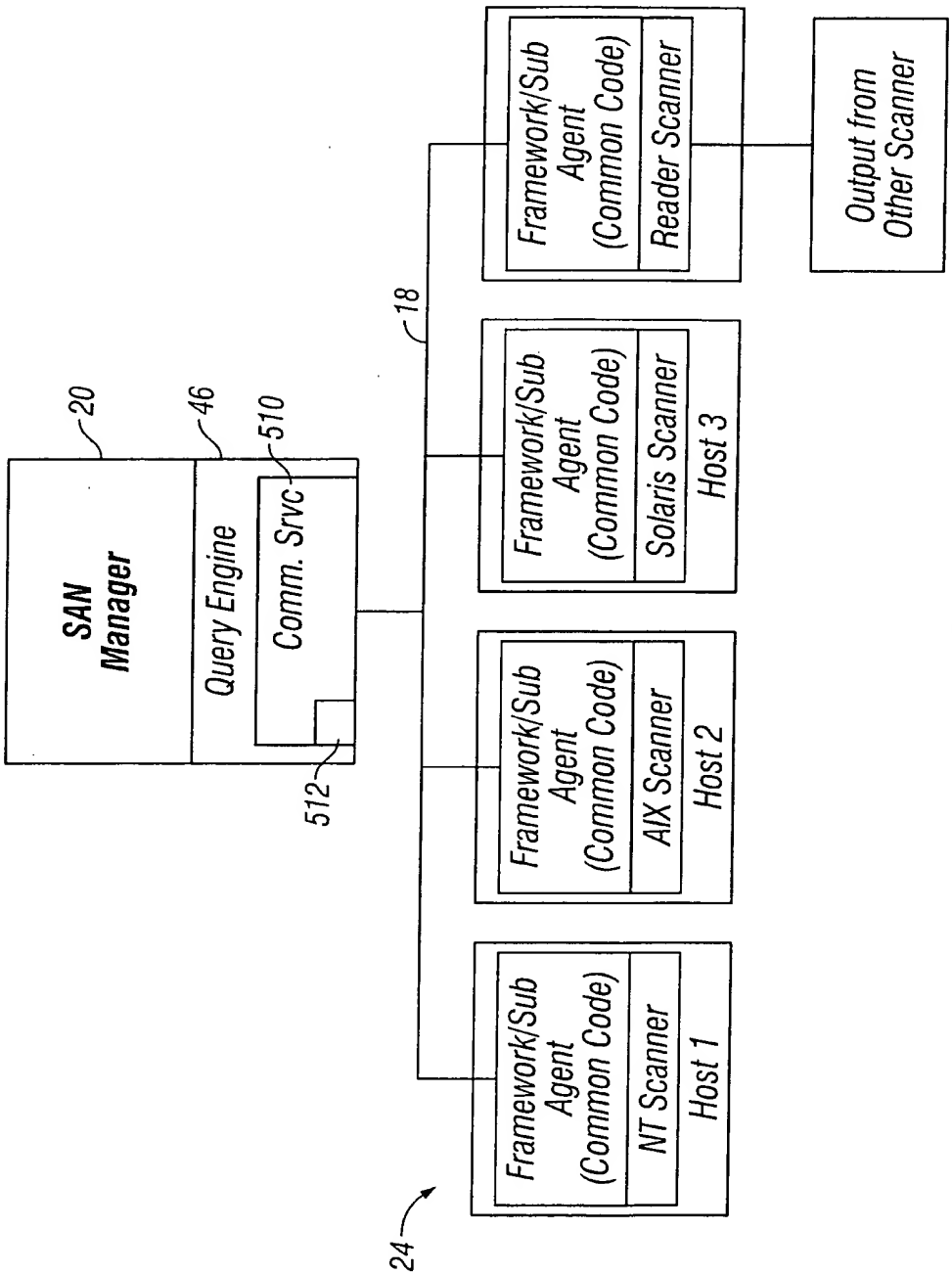
SAN Manager
Query Engine
Comm. Srvc
20
46
510
512
18
24
Framework/Sub Agent (Common Code)
NT Scanner
Host 1
Framework/Sub Agent (Common Code)
AIX Scanner
Host 2
Framework/Sub Agent (Common Code)
Solaris Scanner
Host 3
Framework/Sub Agent (Common Code)
Reader Scanner
Output from Other Scanner

FIG. 43